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# Latin America Report

COMPUTERS, AUTOMATION, INSTRUMENTATION IN BRAZIL

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16 SEPTEMBER 1986

## LATIN AMERICA REPORT

## COMPUTERS, AUTOMATION, INSTRUMENTATION IN BRAZIL

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pp 1-106

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[Text] Structure of This Report

In view of the degree to which this survey has been accepted by the informatics community and in light of its basic purpose, which is to help to generate raw data that would permit those involved in the general-use data processing equipment market to make analytical studies, we have tried to maintain the format of previous publications insofar as possible. In that regard, we have sought to preserve compatibility with the historical series already begun that has been enabling interested parties to evaluate and monitor the evolution of this industry during the past 6 years.

First, in the section entitled "General Overview of the Industry," we present general data on sales, imports, and employment in the domestic and multinational data processing equipment industry producing for the Brazilian market.

Then, in Part I of the section entitled "Overview of the Domestic Industry," the survey analyzes the market for the domestic computers and peripherals sector from the standpoint of sales. Keeping to the same structure used in the earlier study, this part of the analysis is divided into eight chapters.

Chapter I discusses company age and amount of capital for the enterprises surveyed.

An evaluation of the results of sales by domestic companies that make computers and peripherals, as well as a description of these companies within the subsegments of the market in which they are traditionally active, is given in Chapter II.

Chapter III analyses sales from three important approaches: distribution by marketing method, by type of customer, and by geographical region.

The product distribution channels most frequently used by the surveyed companies are described in Chapter IV.

Chapter V contains data on the number of employees working in the computers and peripherals sector, as well as the distribution of such personnel by years of education and type of work. The data on R & D outlays, manpower training expenses, wages, and benefits are also presented in this chapter.

Manufacturer expenses for software development are discussed in Chapter VI.

Chapter VII gives data on the sales volume and value for mini- and micro-computers, peripherals, and other data processing devices. On the basis of this information, we analyze the sales performance of the various types of equipment on the internal market. Also in this chapter is a classification of the systems by price bracket.

Chapter VIII describes the main problems faced by the sector during the past 6 years.

In light of the necessity and importance of obtaining data on the other segments of the informatics sector, this study has, for the first time, collected data from equipment manufacturers in the automation, process control, and instrumentation segments for 1984, with forecasts for 1985. Therefore, Parts II and II of this bulletin supply data on the process control and manufacturing automation industry and on the instrumentation industry.

It would be well to mention that the same questionnaire used to study the general-use data processing equipment market was used to gather data on these two industry segments, since this was the first study of automation, process control, and instrumentation manufacture. Therefore, the information is presented through aggregate data whose results lend themselves to a more meaningful analysis.

The increased knowledge we have gained about these markets will enable us to refine our approach when we make the next report. We will be able to take the peculiarities of each segment into account by developing separate questionnaires for each of them.

## General Overview of the Industry

In this first part of the report, we shall analyze the performance of Brazilian and multinational companies in the computers and peripherals sector. First, we shall discuss gross sales, then imports and, lastly, human resources.

The report on the computer industry for 1984 was based on information from 71 Brazilian companies that represented more than 85 percent of the domestic industry in terms of both sales and capital. It should be emphasized that, even taking into account exclusions of companies no longer surveyed and the inclusion of new companies, the representativeness of the survey sample has been maintained at this same level over the years.

To study the multinational companies, we considered the seven largest. They account for approximately 95 percent of the sales in the sector of computers and peripherals. Data on these companies was taken from the annual progress reports on manufacturing projects. This means that we were able to update the following table on gross sales by Brazilian and multinational companies.

Table 1

Gross Sales					\$ millions
Year Companies	1981	1982	1983	1984	(Est.) 1985
Brazilian	370	558	687	847	1.165
Multinational	670	950	800	881	1.143
Total	1.040	1.508	1.487	1.728	2.308

Import data are presented in the following table:

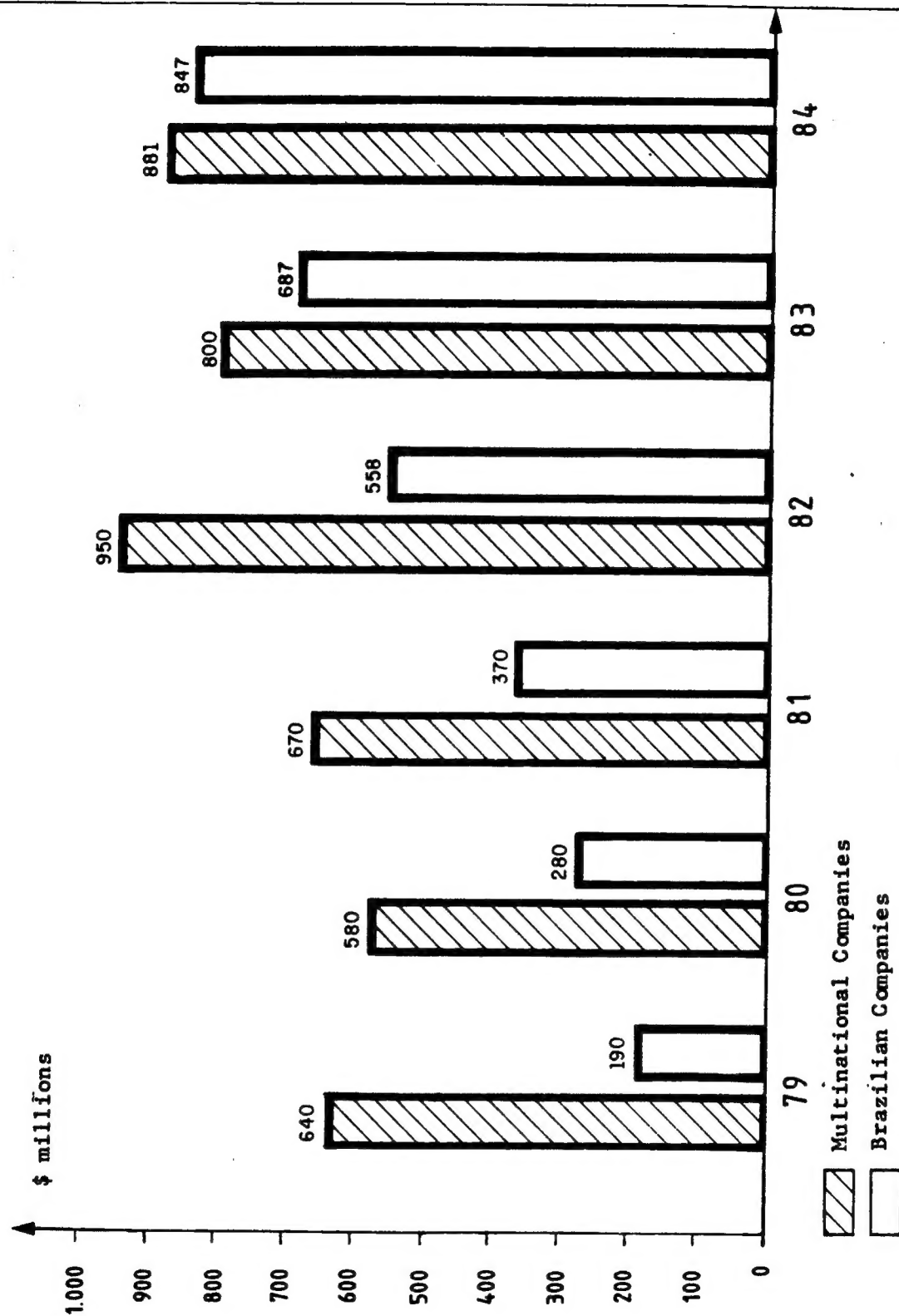
Table 2

Imports					\$ millions
Year Companies	1981	1982	1983	1984	(Est.) 1985
Brazilian	81	50	49	90	96
Multinational	223	208	179	187	174

Figure 1

SEI / 84

# Trend in Sales by Companies in the Brazilian Market



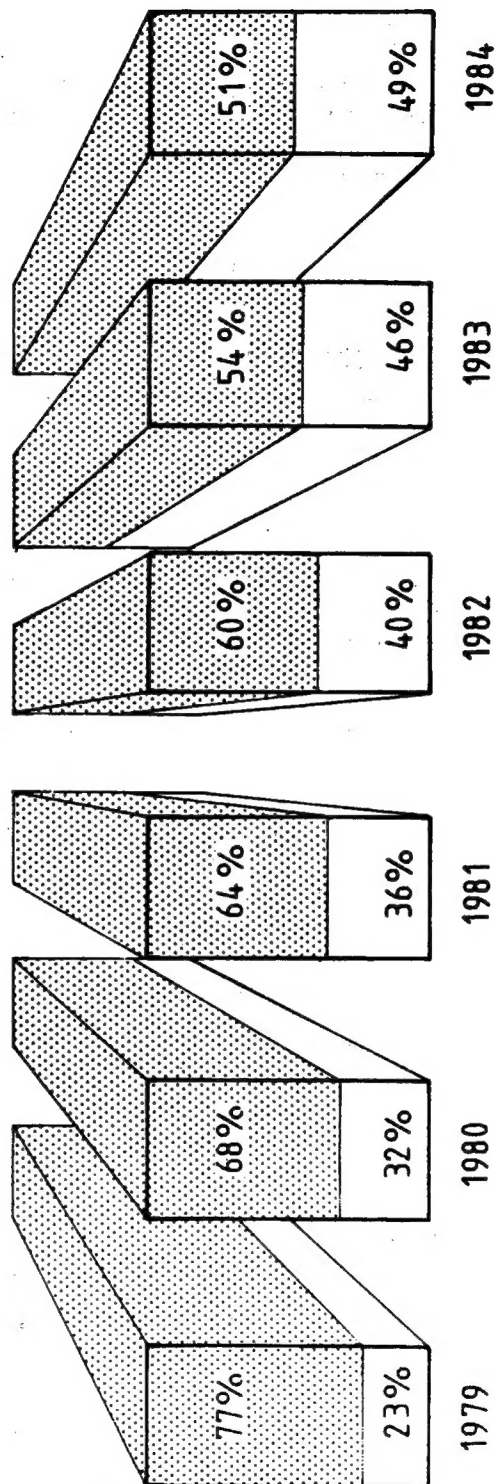
DEM / SEP / SEI

Figure 2

SEI / 84

Trend in Participation in Sales on the Brazilian Market

■ Multinational Companies  
□ Brazilian Companies



DEM / SEP / SEI



It is worth noting that these data were collected in accordance with the same criteria used in the previous survey, that is, on the basis of the annual import quotas allocated to the manufacturers by the Special Office for Informatics, SEI.

The SEI authorized imports of \$277 million in 1984. Brazilian companies imported the equivalent of 10.6 percent of their sales, while the multinationals imported the equivalent of 21.3 percent of what they marketed in that same year. Imports are expected to total \$270 million in 1985, of which \$96 million would be imported by the Brazilian firms and \$174 million by the multinationals.

The next table shows the percentage imports represented of gross sales by Brazilian and multinational companies in recent years.

Table 3

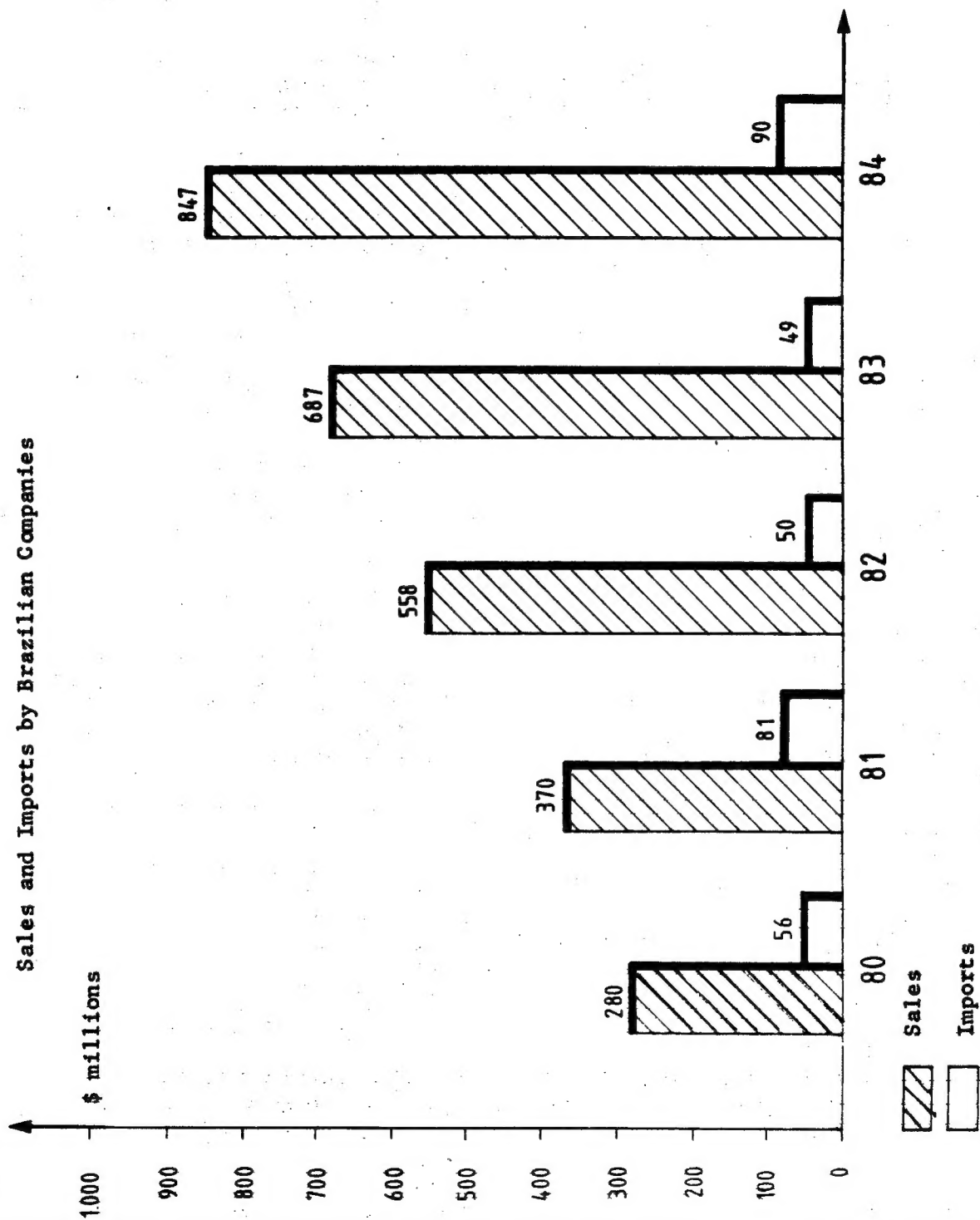
Role of Imports as a Percentage of Gross Sales					
Year Companies	1981	1982	1983	1984	(Est.) 1985
Brazilian	21,9	9,0	7,1	10,6	8,2
Multinational	33,3	21,9	22,4	21,3	15,2

Figures 3 and 4 illustrate, respectively, sales and imports by Brazilian and multinational companies.

Trends in the staffing pattern and the number of college-educated employees by type of activity can be seen from Tables 4 and 5, which break the data down by Brazilian and multinational companies. It should be noted that IBM did not report its total employment for 1984, or the classification of its workers by type of activity. Therefore, it was assumed that IBM's employment level and pattern remained the same as in 1983. In making a projection for 1985, the latest figures furnished by IBM and the 1984 figures for Hewlett-Packard were used in the absence of further data from those firms.

In studying Tables 4 and 5, we find that the number of college-educated professionals assigned to new product development (hardware and software) by Brazilian companies jumped from approximately 831 in 1981 to 1,874 in 1984. Meanwhile, the multinational companies employed 97 technicians in that area in 1981, which rose to 151 in 1984. This reflects the personnel development effort being made by Brazilian companies during those years and the need for highly-skilled manpower for this type of work.

Sales and Imports by Brazilian Companies

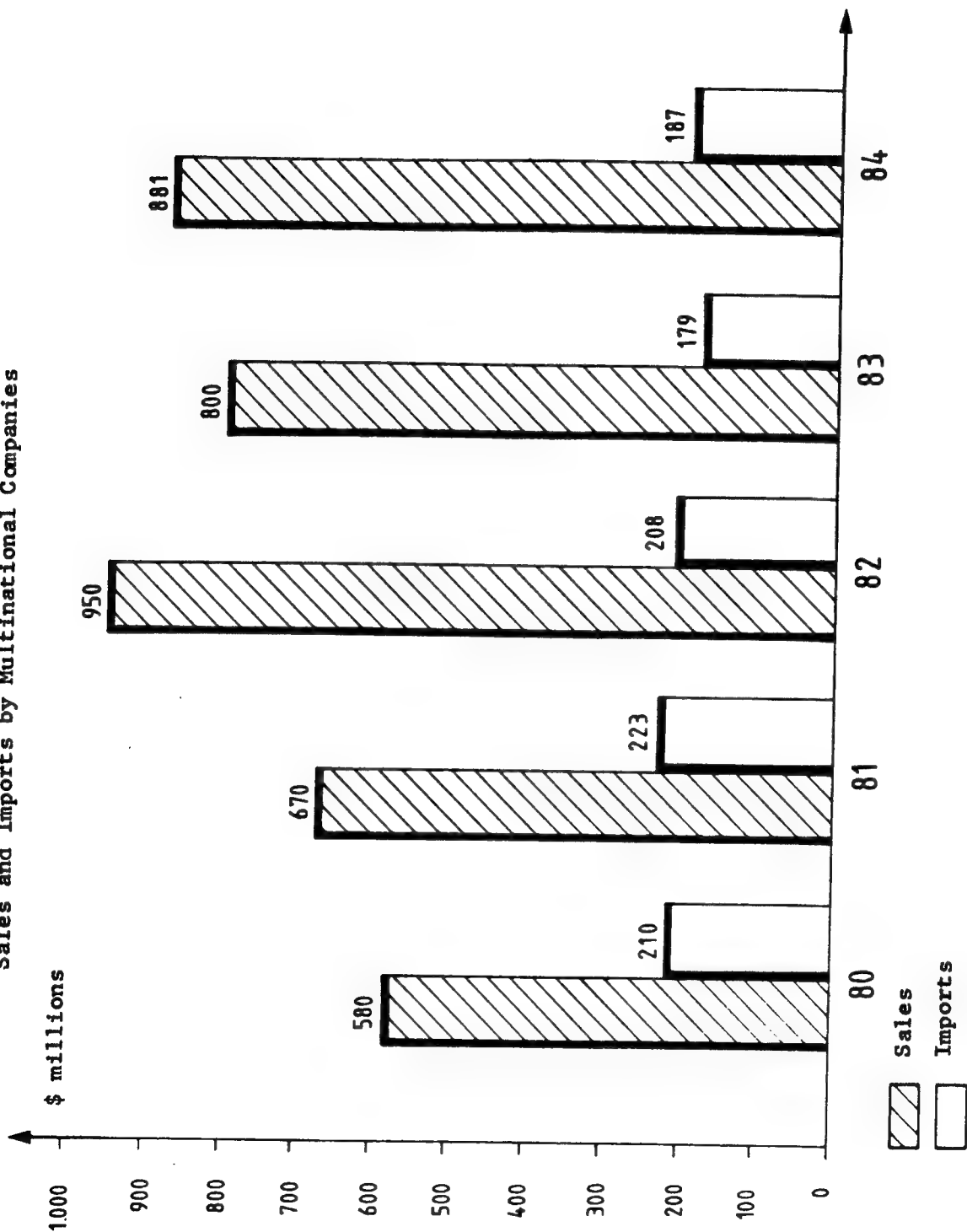


DFM / SEP / SEI

Figure 4

SEI / 84

Sales and Imports by Multinational Companies



DEM / SEP / SEI

Table 4

Total Employment					
Year Companies	1981	1982	1983	1984	(Est.) 1985
Brazilian	8,800	12,584	15,734	21,840	28,359
Multinational	12,200	11,797	10,010	9,684	9,748

Table 6 enables us to see the relationship between the number of college-educated employees per \$100 million sales for the years in the historical series being analyzed.

According to data in SEI Information Bulletin No 14 of September 1985, the Brazilian firms in 1984 had plant and equipment valued \$1,085 million, while the multinationals' facilities were appraised at \$3,255 million. The historical series presented in Table 7 below has been updated on the basis of that data. It correlates the number of college-educated employees working in maintenance with the value of the plant and equipment.

Table 7

Number of College-Educated Employees in Maintenance per \$100 Million Worth of Plant & Equipment				
Year Companies	1981	1982	1983	1984
Brazilian	64	84	80	56
Multinational	10	9	10	15

Table 5

Number of College-Educated Professionals by Type of Work Performed										
Year Type of Work Performed	1981		1982		1983		1984		1985 (Est.)	
	Brazilian Firms	Multinat'l Firms	Brazilian Firms	Multinat'l Firms	Brazilian Firms	Multinat'l Firms	Brazilian Firms	Multinat'l Firms	Brazilian Firms	Multinat'l Firms
Production	279	396	556	422	692	379	816	420	1,147	415
Sales	312	1,077	386	1,130	482	1,204	1,436	1,250	1,849	1,245
Hardware/Software										
Development	831	97	1,083	107	1,177	121	1,874	151	2,623	160
Maintenance	199	193	443	214	572	273	606	481	774	511
Administration	453	791	687	912	961	833	1,047	1,078	1,372	1,823
TOTAL	2,074	2,554	3,155	2,785	3,884	2,810	5,779	3,380	7,765	4,155

Table 6

Number of College-Educated Workers per \$100 Million Sold in the Market									
Year Type of Work Performed	1981		1982		1983		1984		Multinat'l Firms
	Brazilian Firms	Multinat'l Firms	Brazilian Firms	Multinat'l Firms	Brazilian Firms	Multinat'l Firms	Brazilian Firms	Multinat'l Firms	
Production	75	59	100	44	101	47	96	48	
Sales	84	161	69	119	70	150	169	142	
Hardware/Software									
Development	245	14	194	11	171	15	221	17	
Maintenance	-	-	-	-	-	-	-	-	
Administration	122	118	123	96	140	104	124	122	
TOTAL	561	380	566	293	566	351	682	384	

## Overview of the Domestic Industry

### Part I - Computers and Peripherals

#### Chapter I - Company Age and Capitalization

The 71 companies participating in the survey for 1984 responded to the question on company capital and date of founding. It should be noted, however, that the historical series on three companies (Brascom, Codimex, P&D) has been interrupted because they did not take part in the survey this time.

Five other companies have ceased participating: Schumec was absorbed by Racimec in 1984; Metalzilo and Sistema will be discussed in the section on process control and automation; and Globus and Tecnodata are no longer active in the Brazilian market.

We emphasize that this study includes only those companies whose projects have been reviewed by the SEI, which marketed products in the computers and peripherals segment during the year under study, and which responded to the questionnaire on this industry segment.

The following table shows the distribution of enterprises by year of establishment.

<u>Year</u>	<u>Number of Companies Founded During the Year</u>	<u>Total Number of Companies in Existence</u>
Pre-1974	12	12
1974	1	13
1975	1	14
1976	5	19
1977	6	25
1978	7	32
1979	8	40
1980	7	47
1981	8	55
1982	8	63
1983	4	67
1984	4	71
TOTAL	71	71

Within the various brackets used for purposes of historical analysis, the oldest group of companies--those established prior to 1974--continues to

account for the largest share of the companies studied, approximately 17 percent. It is well known that the oldest companies have, traditionally, been engaging in other branches of electronics, or even in completely different types of business.

The year 1984 saw the addition of four new companies to the survey sample. Two of them belong to the peripherals segment: Expansao and Perifericos. The other two--Percomp and ABC-Dados--are discussed under the "other devices" segment.

The total capital reported by the 71 companies in 1984 amounted to approximately 211 billion cruzeiros, representing a nominal growth on the order of 263 percent compared with 1983 and exceeding the projected growth for 1984 just as occurred during 1982-83.

The respondents estimated their 1985 capital at 960 billion cruzeiros, for an estimated nominal growth of 355 percent. Expectations are even higher for 1986, in light of the fact that regulations have been issued to implement Article 21 of Law 7,232/84. This will enable the companies in the sector to increase their capitalization.

It is worth emphasizing, too, that the informatics industrial sector has shown average growth during the past 6 years, and highly significant growth in terms of sales--about 30 percent. However, the great majority of the companies in the sector have been operating with insufficient capital.

The ten top-ranking companies in terms of capital are responsible for approximately 72.3 percent of the total capital reported by the Brazilian companies, as the following table shows.

<u>Company</u>	<u>Capital</u> <u>(million cruzeiros)</u> <u>Current Prices</u>	<u>% of the Total</u>
Cobra	53,171.00	25.2
Itautec	18,636.00	8.8
Polymax	13,950.00	6.6
Medidata	13,828.00	6.5
Labo	11,402.00	5.4
Digirede	10,728.00	5.1
Edisa	10,009.00	4.8
Dismac	7,500.00	3.6
Elebra Telecon	6,701.00	3.2
Sid	6,350.40	3.1
TOTAL	152,275.40	72.3

In comparison with the study made for 1983, we find a reduction in the degree of capital concentration since, in 1983, the 10 top companies had accounted for 78.4 percent of total capital. Note, too, that seven of the 10 largest companies in terms of capital, as identified in 1983, were still in that group when the 1984 study was made. They are: Cobra, Labo, Elebra Telecon (formerly Elebra Eletronica), Itaotec, Edisa, Dismac, and Sid. The other three--Polymax, Medidata, and Digirede--were included this year. Digirede showed the highest factor of increase over previously declared capital of any of the 10.

In terms of value, the most representative capital increases, adding up to approximately 76 percent of the total volume of paid-in capital during 1984, were also made by the 10 largest companies in terms of capital--except for Elebra Telecon, and with the inclusion of Elgin, which raised its capital by approximately 182 percent over its 1983 level. It is important to remember that the values referred to here are in current prices for the respective years.

The following table lists the 10 largest companies and indicates the percentage share each holds in the amount of capital nominally paid in, as well as the growth factor in relation to the previous capital level.

<u>Company</u>	<u>Percentage of Total Capital Added (83/84) %</u>	<u>Growth Factor Compared with Previous Capital</u>
Cobra	25.8	3.60
Itaotec	9.7	4.43
Medidata	8.9	27.65
Polymax	8.6	11.93
Digirede	7.1	61.30
Edisa	4.1	2.56
Labo	3.3	2.28
Dismac	3.2	2.77
Sid	2.8	2.85
Elgin	2.7	2.82
Total	76.21	--

Cobra remains in first place in the sector, both in terms of volume of subscribed capital and in terms of total paid-in capital in 1984. During the year more than half of the companies who participated in the survey increased their capital over 1983 levels. The following table shows which companies accomplished the largest relative increases in capital and indicates the market segment in which they are active.



<u>Ranking</u>	<u>Company</u>	<u>% (83/84)</u>	<u>Market Segment</u>
1	Digirede	6,030.3	Systems
2	Unitron	4,465.8	Systems
3	Stratus	2,900.0	Systems
4	Microtec	2,807.0	Other Devices
5	Medidata	2,665.6	Systems

Digirede distinguished itself by having the highest capital growth factor; its capital soared from 175 million cruzeiros in 1983 to 10 billion cruzeiros in 1984.

Unitron ranks right behind Digirede with 1984 capital on the order of 1 billion cruzeiros, 4,466 percent higher than in the previous year, when it was 22 million cruzeiros.

Not only did Digirede and Medidata, in contrast to the other companies in the table, record significant relative capital growth; they also received substantial capital inputs in absolute terms.

The factors of relative growth in the capital of Unitron, Stratus, and Microtec become meaningful only in relation to their own contributions to capital in 1983.

Continuing with the analysis of the above table, we note that the four companies that added the most to their capital, in relative terms, are systems manufacturers. One of them--Medidata--is active in the minicomputer segment.

Once again we see that systems companies predominate among the firms which increased their capital by the largest amounts. This confirms what was observed in earlier studies. The next table supplements the previous one.

<u>Ranking</u>	<u>Company</u>	<u>% (83/84)</u>	<u>Market Segment</u>
6	TDA	2,238.0	Peripherals
7	Flexidisk	1,236.0	Peripherals
8	Polymax	1,093.4	Systems
9	Menno	900.8	Other Devices

Note that only three of the companies that showed the greatest relative changes in capital--Medidata, Digirede, and Polymax--are also on the list of the 10 top companies in terms of capitalization. This demonstrates, once again, the rapid rate of growth of the smaller companies in comparison to the larger companies in the sector, which showed only small percentage changes in their capital. The table on the next page indicates the number of companies, grouped by volume of capital.

<u>Capital Category</u>	<u>Number of Companies</u>
Over 4 billion cruzeiros	14
Between 1.1 billion and 4 billion cruzeiros	12
Between 501 million and 1 billion cruzeiros	7
Between 101 million and 500 million cruzeiros	13
Between 26 million and 100 million cruzeiros	11
25 million cruzeiros or less	14

There has been a significant increase in the number of companies in the highest capital category--those over 4 billion cruzeiros--since the last survey.

It must be pointed out that Appletronica, Eletrodigi, Flexidisk, Mecaf, Sid, Spectrum, Elogica, and Stratus did not provide forecasts of 1985 capital levels. Although it does not permit a very precise analysis of the trends, the 1984 capital assets figure was used again for 1985 in making forecasts for these companies.

The largest increments in capitalization in 1985 are projected for Cobra, Edisa, Itaotec, Medidata, and Digirede. The next table list the companies that are expected to record the biggest changes in capitalization in 1985.

<u>Ranking</u>	<u>Company</u>	<u>% (84/85)</u>
1	Diginet	5,233.3
2	Softec	3,433.3
3	Telematica	3,233.3
4	Micro/Servo	1,900.0
5	Edisa	1,694.9
6	PGM	1,654.4
7	Basio	1,455.5
8	Scritta	1,011.1
9	Moddata	966.6
10	Videotek	900.0
11	STI	900.0

Once again, we see that the companies that had the best prospects for increasing their capital are not among those who did in fact record the highest such increases. The same is true if we compare these companies, with the exception of Edisa, with the 10 largest in the sector in terms of paid-in capital. This confirms the growth trend observed among the companies that are smaller in terms of capital.

Table I, which follows the end of this chapter, shows the evolution of the capital, the year of founding, and the percentage of capital growth experienced by each company during the final year of the historical series.

In view of the lack of information for earlier years concerning companies which participated in the survey for the first time this year, some of the historical series begin with 1984.

Note that even though some companies are no longer in the survey, while others have been added, the comparative analysis remains consistent because in every year the sample has been maintained in such a way as to cover the companies that together account for more than 85 percent of informatics industry sales.

The chart on the next page (Figure 1.1) illustrates the evolution of the capital of the Brazilian companies in this sector during the period 1979-84.

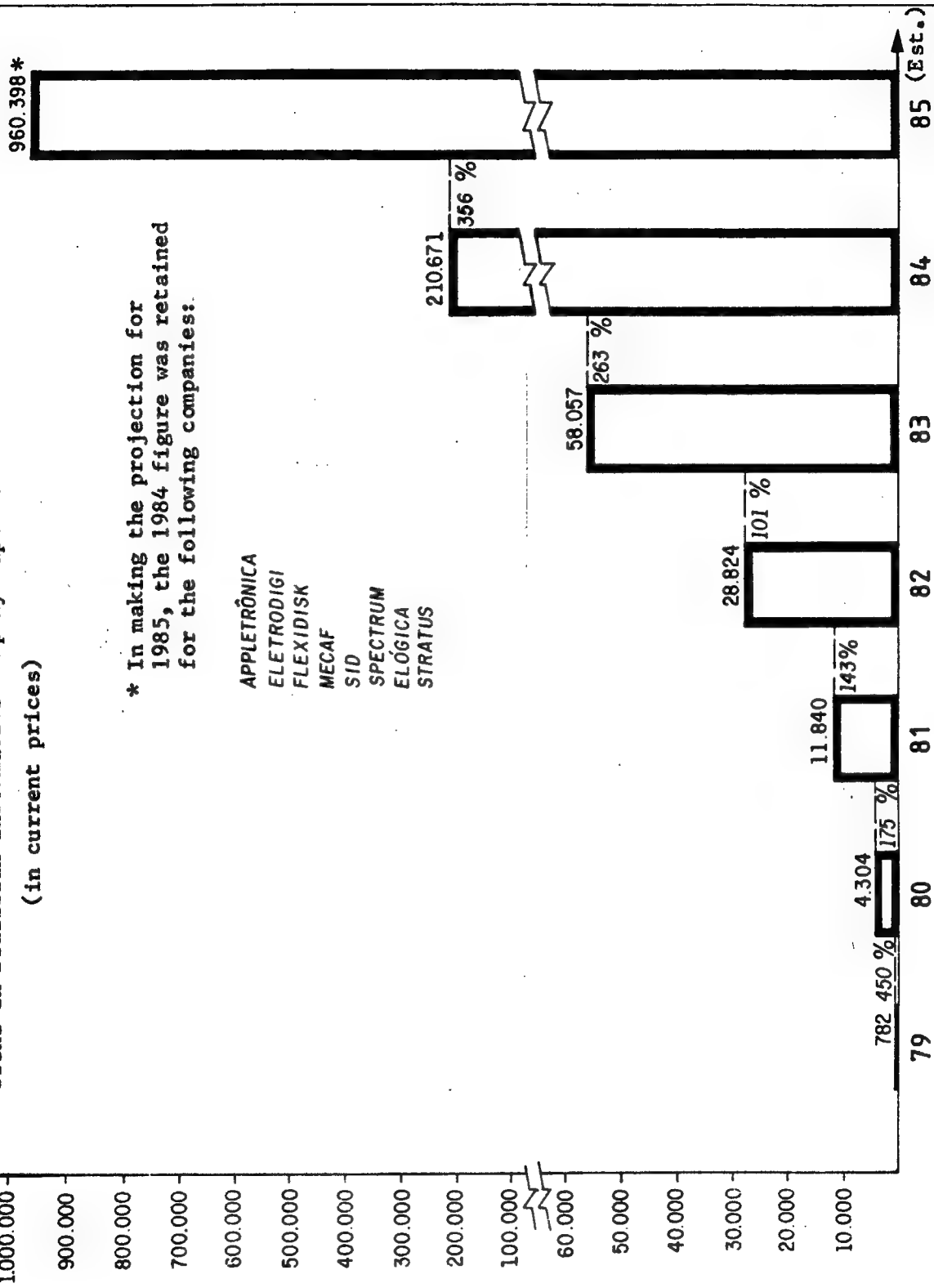
Figure I - 1

SEI / 84

Trend in Brazilian Informatics Company Capital  
(in current prices)

\* In making the projection for 1985, the 1984 figure was retained for the following companies:

APPLETRÔNICA  
ELETRODIGI  
FLEXIDISK  
MECAF  
SID  
SPECTRUM  
ELÓGICA  
STRATUS



DEM/SEP/SEI

Table I

SEI/84

Company Name	Date Founded	Company Age and Capital						(cruzeiro millions)	
		1979	1980	1981	1982	1983	1984	(Proj.) 1985	% Change 83/84
COBRA	07/74	222,866	581,100	3,398,900	7,941,300	14,745,000	53,171,000	333,883,000	280,6
ITAUTEC	11/74	10,000	35,000	348,000	1,000,000	4,210,000	18,836,000	60,000,000	342,7
POLYMAX	08/77	-	25,000	63,000	130,000	1,188,000	13,980,000	27,980,000	1,083,4
MEDIDATA	10/76	13,000	18,000	38,000	180,000	500,000	13,828,000	46,000,000	2,886,8
LABO	10/81	-	150,000	1,080,000	1,086,000	8,428,510	11,402,000	11,402,000	77,4
DIGIREDE	03/77	-	-	2,000	2,000	175,000	10,728,000	48,000,000	6,030,3
EDISA	11/77	118,911	218,500	914,000	2,480,989	3,901,000	10,009,000	178,882,000	186,8
DISMAC	01/73	-	-	-	1,200,000	2,700,000	7,900,000	30,000,000	177,8
ELBERRA TELECOM	08/70	175,760	840,534	1,094,522	2,421,448	4,771,000	6,701,000	8,701,000	40,5
SID	01/78	-	350,000	713,800	1,137,844	2,228,211	6,350,400	8,380,400	186,0
ELGIN	03/52	-	-	-	1,000,000	2,200,000	6,200,000	18,600,000	181,2
AUTODATA	12/81	-	-	-	-	-	5,000,000	31,380,000	-
SCOPUS	08/75	18,000	50,000	800,000	3,000,000	4,300,000	21,292,400	21,292,400	43,3
FLEXIDISK	01/79	-	7,800	15,000	75,000	300,000	4,008,000	4,008,000	1,238,0
ELBERRA INF.	03/79	55,000	208,888	248,870	883,874	1,322,500	3,735,000	8,735,000	182,4
QUARTZIL	03/80	-	23,050	107,900	248,500	734,300	3,630,400	11,600,000	287,4
SISCO	10/78	24,483	38,008	427,832	584,088	1,155,000	2,984,000	9,383,000	156,8
MICROLAB	07/82	41,845	81,298	100,000	510,000	1,215,000	2,821,000	16,000,000	115,7
DIGILAB	07/79	10,000	51,496	90,000	400,000	1,000,000	2,558,000	13,000,000	156,8
SPILCE	05/71	-	-	150,000	300,000	950,000	2,450,000	12,000,000	187,8
NOVADATA	10/79	-	35,128	67,593	430,000	731,000	2,380,000	13,249,810	228,8
RACIMEC	09/86	-	-	66,174	250,000	250,000	2,000,000	10,000,000	700,0
EXPANSÃO	08/84	-	-	-	-	-	1,848,000	4,500,000	-
MULTIDIGIT	10/78	-	0,400	25,000	54,000	110,000	1,800,000	1,800,000	1,263,8
MENNO	05/82	-	-	-	120,000	120,000	1,201,000	1,201,000	900,8
ELETRDIGI	05/81	-	-	-	5,000	1,100,000	1,100,000	1,100,000	0,0
DIGIPONTO	02/77	-	-	-	-	-	1,060,000	4,820,000	-
UNITRON	02/82	-	-	-	-	-	1,060,000	4,820,000	-
COENCISA	12/78	51,000	111,000	276,000	480,240	1,008,000	1,008,000	8,087,800	4,488,8
PARKS	08/86	12,700	12,700	28,000	52,000	340,000	1,000,000	3,800,000	194,1
PERIFERICOS	04/84	-	-	-	-	-	1,000,000	1,000,000	-
MODDATA	01/78	-	11,000	20,000	36,000	108,000	780,000	8,000,000	584,4
ELOGICA	03/83	-	-	-	-	-	800,000	800,000	-
MICROTEC	08/80	-	-	3,200	3,200	17,000	800,000	1,200,000	2,841,2
COMPART	05/80	-	3,000	45,000	83,000	188,000	487,000	2,222,000	158,0
ARCOADOS	08/84	-	-	-	-	-	484,000	484,000	-
TDA	02/81	-	-	-	4,000	15,000	350,700	350,700	2,238,0
STRATUS	02/81	-	-	-	10,000	10,000	300,000	300,000	2,900,0
EBG	04/77	3,428	10,948	18,900	36,200	119,300	281,000	900,000	135,5
GEFETO	08/77	0,800	2,300	11,500	42,550	42,550	257,000	858,000	802,6
MICRODIGITAL	10/81	-	-	5,000	15,000	34,000	228,000	1,000,000	970,6
MAQUIS	10/80	-	-	-	-	-	225,000	822,210	-
DIGITEL	11/78	0,800	0,800	3,200	8,500	47,000	215,000	1,080,000	357,5
MOA	10/79	-	-	3,000	25,000	63,000	200,000	850,000	217,5
ZANTHUS	10/79	-	-	-	-	44,850	181,770	1,400,000	327,8
PGM	11/78	-	-	-	-	-	114,000	2,000,000	-
PERCOMP	05/84	-	-	-	-	-	100,000	150,000	-
VICTOR	04/82	-	-	-	-	-	97,000	200,000	-
CETUS	04/83	-	-	-	-	-	90,000	500,000	-
SPECTRUM	03/79	-	-	15,000	63,487	63,487	83,480	83,480	0,0
LOGUS	03/81	-	-	-	-	-	58,000	220,000	-
APPLETRONICA	06/82	-	-	-	10,000	27,000	58,000	58,000	107,4
CMA	07/80	-	1,000	1,000	1,000	51,000	51,000	300,000	0,0
MECAF	09/82	-	-	-	-	-	50,000	50,000	-
CCE	09/71	-	-	-	-	-	38,560	121,800	-
ELETROTELA	10/73	-	-	7,400	14,400	37,000	37,000	80,000	0,0
SCRITTA	02/83	-	-	-	-	-	36,000	400,000	-
MAGNEX	11/82	-	-	-	-	-	25,000	180,000	-
PROLOGICA	11/78	-	3,000	25,000	25,000	25,000	25,000	25,000	0,0
VIDEOTEK	02/76	-	-	-	4,200	4,200	25,000	250,000	586,2
DIGITUS	02/80	-	-	-	6,000	21,000	21,000	200,000	0,0
SOFTTEC	09/82	-	-	-	-	-	15,000	530,000	-
TELEMÁTICA	10/80	-	-	-	-	-	15,000	500,000	-
TROPICAL	06/78	-	-	-	-	-	15,000	30,000	-
DIGIBYTE	03/82	-	-	-	10,000	10,000	10,000	10,000	0,0
STI	03/82	-	-	-	-	-	10,000	100,000	-
BASIC	07/81	-	-	-	-	-	9,000	140,000	-
DIGINET	08/83	-	-	-	-	-	7,500	400,000	-
METALMA	07/58	-	-	-	-	-	6,000	19,000	-
LOGODATA	01/79	-	-	-	-	-	1,500	1,500	-
MICRO/SERVO	12/81	-	-	-	-	-	0,500	10,000	-
GLOBUS	05/78	20,000	50,000	84,974	218,671	370,900	-	-	-
SISTEMA	08/73	-	10,000	40,000	40,000	132,000	-	-	-
P & D	08/79	-	5,000	15,000	25,000	100,000	-	-	-
BRASCOM	07/81	-	-	20,000	45,000	85,000	-	-	-
METALZILO	01/82	-	-	-	15,300	38,800	-	-	-
TECNUDATA	05/79	1,200	5,040	5,040	17,000	17,000	-	-	-
SCHUMEC	01/79	-	-	1,000	8,000	12,000	-	-	-
CODIMEX	05/82	-	-	-	1,000	10,000	-	-	-
TOTAL	-	780,572	2,915,470	10,048,910	24,081,927	58,057,208	210,871,110	980,396,200	282,9

Notes: 1 - Table based on the companies that participated in the 1984 survey.

2 - In making the projection, the 1984 figures were maintained for Appletronica, Eletrodigi, Flexidisk, Mecaf, Sid, Spectrum, Elogica, and Stratus.

## Chapter II - Sales

As defined in this report, sales are the sums obtained through marketing the products and through rental and other services provided by the computers and peripherals industry, net of taxes, during each calendar year--whether or not such sums were actually invoiced and entered into the account books.

In 1984, the 71 companies studied--which accounted for more than 85 percent of the market for computers and peripherals--recorded total net sales of 1,261 trillion cruzeiros. This value exceeded by approximately 21 percent the projections furnished by the companies in the previous year, and meant nominal growth on the order of 344 percent over 1983. These sales, associated with the growth in production of this segment, acquire even more importance when we consider the state of the country's economy.

In 1984, statistics pointed to a resumption of economic growth and the country passed through a period of economic transition. The performance of the Brazilian economy, as measured by GNP growth rate, featured an exceptional recovery when compared with the results for 1983. The economy as a whole achieved a real economic growth rate of 4.5 percent; the industrial sector grew by 5.9 percent; and the computers and peripherals segment--distinguished for its dynamic development--expanded at an average annual rate of 30 percent.

It is worth mentioning that the 71 companies surveyed paid approximately 303 billion cruzeiros in taxes, which means that their gross sales were on the order of 1,564 trillion cruzeiros.

The five sales leaders in 1984 were Cobra, Sid, Itautec, Prologica, and Digirede, in that order. Just under half--47.4 percent--of sales were concentrated in their hands. This was a slight increase over the situation in 1983. When we look at the 10 top sellers, we find that they accounted for 67.5 percent of sales, which is also slightly above the figure for the previous year. The table below illustrates the behavior of this variable during the past 6 years.

Companies	1979	1980	1981	1982	1983	1984
Top 5 Sellers	88,8	65,8	53,6	51,1	46,4	47,4
Top 10 Sellers	98,0	83,2	77,5	73,1	65,8	67,5

As can be seen in the following table, Cobra and Sid have consistently ranked among the five top sellers.

Rank	1979	1980	1981	1982	1983	1984
1	COBRA	COBRA	COBRA	COBRA	COBRA	COBRA
2	SID	SID	LABO	LABO	SID	SID
3	EDISA	LABO	SID	SID	LABO	ITAUTEC
4	SCOPUS	EDISA	ELEBRA INF.	ELEBRA INF.	PROLÓGICA	PROLÓGICA
5	COENCISA	SCOPUS	EDISA	PROLÓGICA	DIGIREDE	DIGIREDE

Itautec, the company which ranked seventh in 1983, joined the top five. Prologica and Digirede maintained the same positions in 1984 as they held in 1983. The following table enables us to see the share of total sales won by each of the 10 leading sellers during the period 1979-84.

Rank	Company Name	% of Total Sales					
		1979	1980	1981	1982	1983	1984
1	COBRA	58,8	30,4	27,7	22,3	16,6	13,6
2	SID	16,1	13,3	6,3	7,3	12,1	12,2
3	ITAUTEC	—	—	1,2	0,4	4,1	7,7
4	PROLÓGICA	1,8	1,6	1,9	6,0	6,5	7,5
5	DIGIREDE	—	—	1,5	4,3	4,4	6,4
6	ELEBRA INFORMÁTICA	0,4	3,0	5,8	7,1	3,9	5,3
7	LABO	3,8	10,8	8,3	8,4	6,8	4,2
8	SCOPUS	4,2	5,2	5,4	5,0	4,0	3,8
9	SISCO	0,5	3,9	4,9	4,2	4,2	3,6
10	RACIMEC	—	—	3,2	3,3	3,2	3,2

We see a certain constancy in this group of the 10 leading sellers in that the same companies have appeared there since 1981; only their relative ranks have varied. Cobra remains the leading firm in the sector in terms of sales, while Sid stands out because it has consolidated and maintained its position on the domestic market throughout the years.

The following table indicates the companies whose rate of sales growth exceeded 1000 percent.

Rank	Company	% (83/84)
1	Microtec	11,254.8
2	Moddata	1,209.5
3	CMA	1,055.1
4	Videotek	1,023.6

In analyzing the previous table, we find that the highest growth rate was realized by a company in the microcomputer segment. Note, however, that these percentages represent gains from modest levels that together constitute only about 1 percent of total sales.

The estimates for 1985 obtained in the survey indicate anticipated net sales on the order of 5.526 trillion cruzeiros for the computers and peripherals segment. This means nominal growth of approximately 338 percent over 1984, which is perfectly consistent with the performance of the sector during the past 6 years.

We might expect the computers and peripherals industry to achieve even better results if we consider that, beginning in 1985, the superminis will be coming onto the market.

Note that the projected figure to be paid in taxes in 1985 is 1.3 trillion cruzeiros, which is practically equivalent to total net sales in 1984.

The following table describes the composition of each segment, by company. In preparing this classification, we took into consideration the trend toward vertical integration of the industrial units, as well as product diversification. This means that the criteria used were flexible. The intent was always to maintain coherence with the historical series whenever possible.

Market Segment	Companies
Minicomputers	COBRA, EDISA, LABO, NOVADATA, MEDIDATA, SISCO, SID
Microcomputers	APPLETRÔNICA, AUTO-DATA, BASIC, CCE, DIGIBYTE, DIGINET, DIGIREDE, DIGITUS, DISMAC, ELÓGICA, LOGUS, MAGNEX, ITAUTEC, MAQUIS, MICROTEC, MICRODIGITAL, MICRO/SERVO, POLYMAX, PROLÓGICA, QUARTZIL, SCOPUS, SOFTEC, SPECTRUM, SPLICE, UNITRON, VICTOR
Peripherals	CONPART, EBC, ELEBRA INFORMÁTICA, ELGIN, EXPANSÃO, SCRITTA, DIGILAB, CMA, TDA, TELEMÁTICA, VIDEOTEK, FLEXIDISK, MULTIDIGIT, PERCOMP, PERIFÉRICOS, MICROLAB
Other Devices	ABC DADOS, ELETRODIGI, ELETROTELA, RACIMEC, GEPETO, ELEBRA TELECON, ZANTHUS, MODDATA, COENCISA, DIGITEL, PARKS, TROPICAL, PGM, STI, STRATUS, CETUS, DIGIPONTO, LOGODATA, MDA, MECAF, MENNO, METALMA



The percentage of sales accounted for by each market segment can be seen in the following table, but the analysis of these data will appear in the chapter on hardware.

<u>Product Group</u>	<u>% of Total 1984 Sales</u>	<u>Projected 1985</u>
Microcomputers	32.9	32.3
Minicomputers	38.8	32.2
Peripherals	17.6	22.4
Other Devices	10.7	13.1
TOTAL	100.0	100.0

The graphs illustrating the data discussed in this chapter appear on the following pages. Table II, published at the end of this chapter, shows each company's data processing sales (in current prices) throughout the 6-year period, thereby giving a better picture of company growth.

Figure II - 1

Cr\$ x 10<sup>6</sup>

# Development of Company Sales

(current prices)

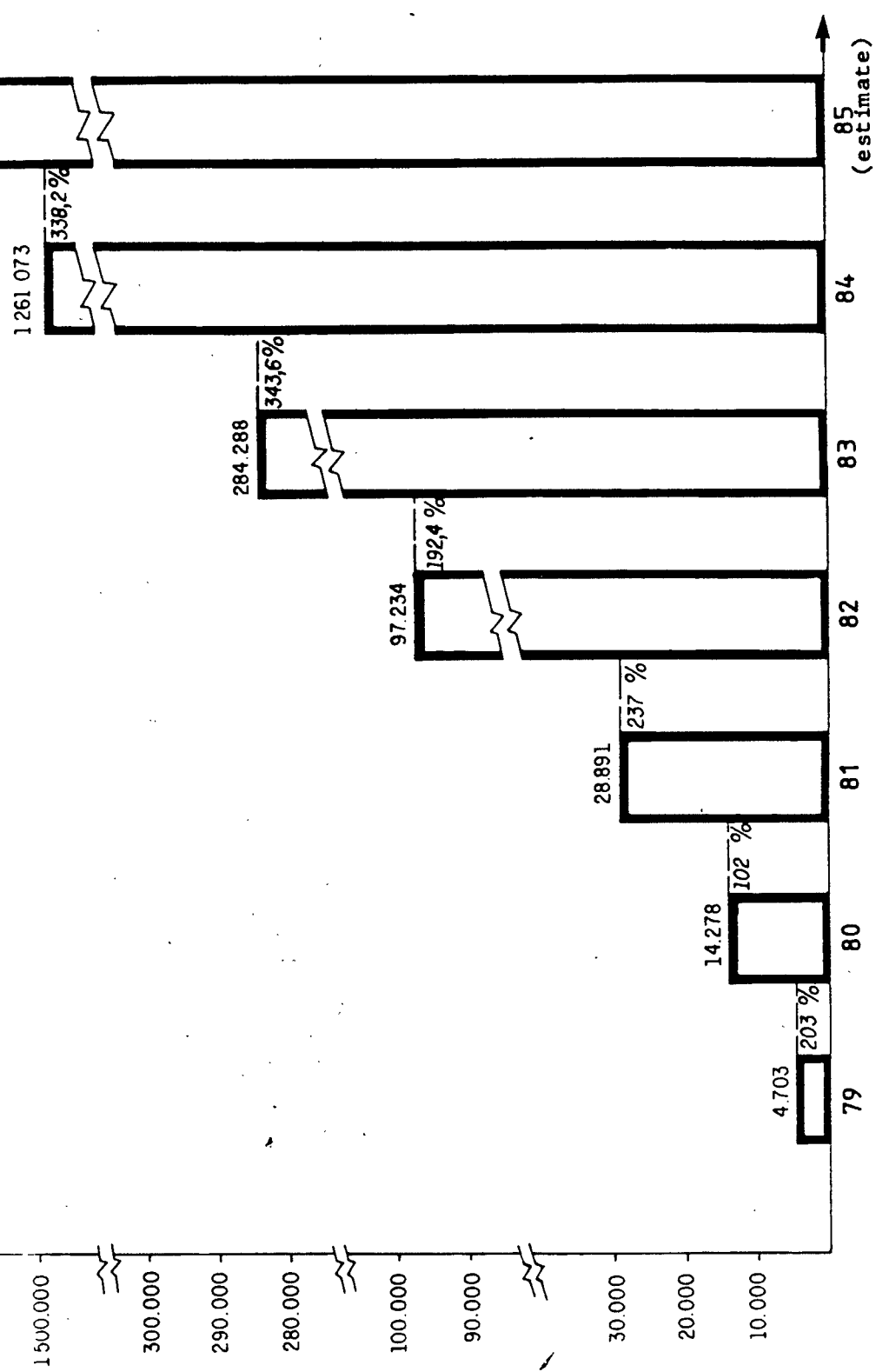
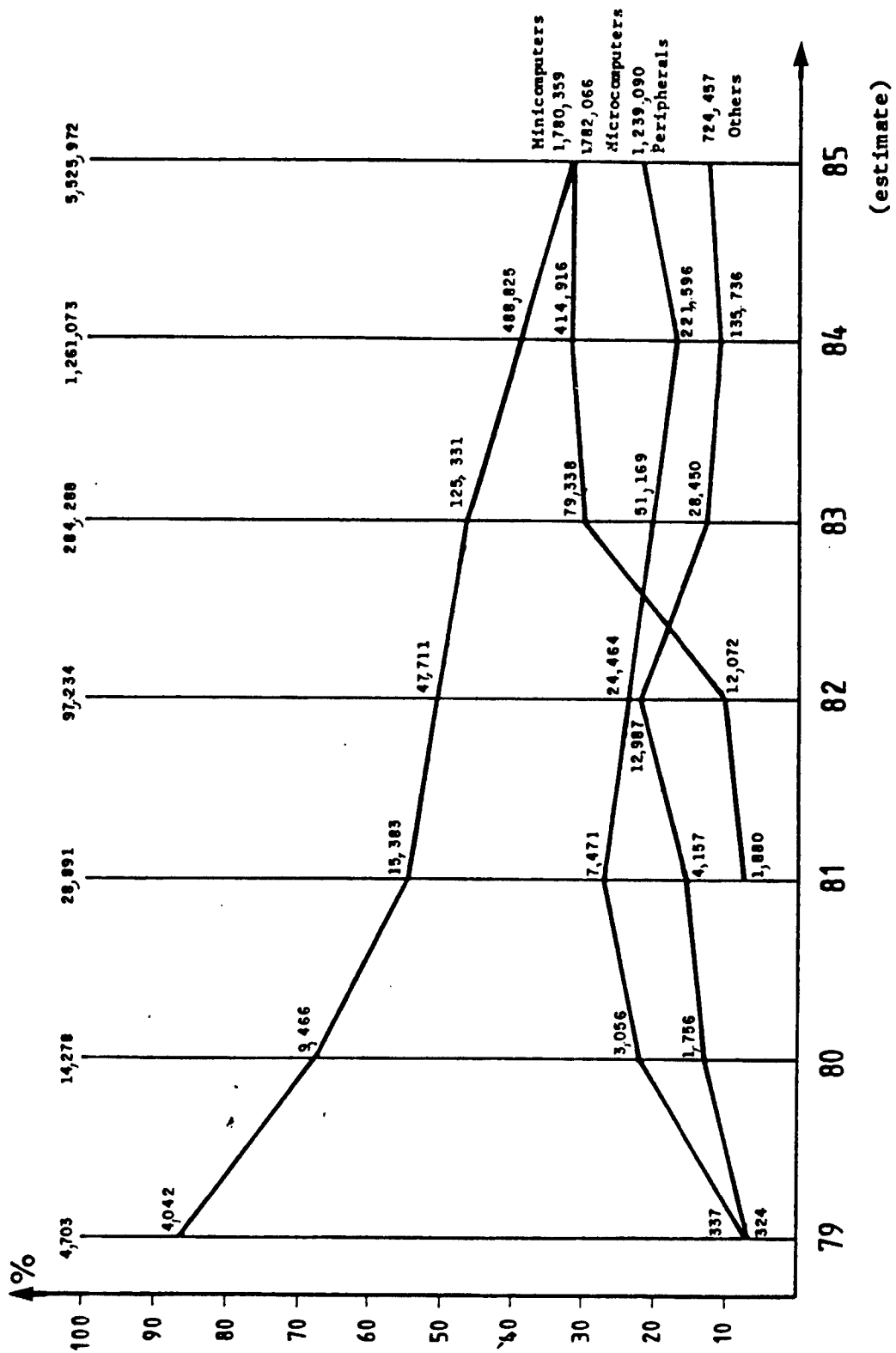


Figure II - 2

SEI / 84

Percentage Distribution of Sales by Industry Segment  
(current prices in million cruzeiros)



DEM / SEP / SEI

Table II

SEI/84

## Data Processing Sales - Current Prices

Company Name						(cruzeiro millions)		
	1979	1980	1981	1982	1983	1984	(Est.) 1985	% Change 83/84
COBRA	2.753.100	4.345.500	7.659.300	21.711.100	47.331.400	171.274.000	620.972.000	281,9
SIO	754.000	1.901.000	1.745.300	7.138.307	34.414.903	154.310.450	447.299.701	348,4
ITAUTEC	-	-	343.349	384.743	11.632.880	96.984.000	493.756.000	733,7
PROLOGICA	84.815	228.766	520.500	5.738.421	18.420.510	94.093.880	300.000.000	410,8
DIGIREDE	-	-	400.000	4.200.000	12.444.900	80.581.000	195.000.000	547,5
ELEBRA INF.	20.588	431.996	1.582.800	6.941.225	11.070.800	68.332.000	350.919.000	499,2
LABO	178.589	1.548.353	2.287.829	8.172.704	19.344.890	53.128.000	224.406.000	174,6
SCOPUS	195.927	746.925	1.501.794	4.817.078	11.233.200	48.202.100	223.276.600	329,1
SISCO	23.782	561.207	1.381.729	4.082.688	12.077.000	48.832.000	240.000.000	279,5
RACIMEC	-	-	923.715	3.200.000	9.188.000	40.844.000	257.000.000	343,3
EDISA	268.559	852.855	1.509.411	4.520.000	6.981.000	34.908.000	144.205.000	408,800
MICROLAB	67.707	398.392	1.211.711	2.455.430	7.382.000	30.381.000	167.668.000	311,3
DIGILAB	-	371.380	661.380	1.980.471	8.541.000	28.637.000	237.453.000	235,3
FLEXIDISK	9.918	114.000	344.000	1.500.000	6.000.000	26.083.000	125.996.540	334,7
MEDIDATA	63.837	278.000	802.000	1.881.000	4.188.000	23.337.000	80.000.000	457,0
POLYMAX	13.000	277.000	1.112.000	2.808.647	8.550.500	22.825.000	115.000.000	186,9
ELEBRA TELECON	-	462.696	885.410	1.272.900	5.937.000	20.969.000	73.801.000	253,2
EXPANSÃO	-	-	-	-	-	15.035.270	92.250.000	-
MECAF	-	-	-	-	-	14.312.000	47.751.988	-
COENCISA	189.606	288.496	646.290	1.345.882	4.087.900	14.025.800	72.000.000	244,8
MICRODIGITAL	-	-	10.000	350.000	2.885.000	13.810.000	55.000.000	375,0
DIGIPONTO	-	-	-	-	-	13.589.600	66.000.000	-
ELGIN	-	-	-	465.388	3.383.580	13.176.432	48.096.400	291,7
MULTIDIGIT	-	193.240	284.816	213.063	1.583.000	11.072.000	56.500.000	599,4
CONPART	-	105.031	178.718	1.616.879	4.037.000	9.573.000	49.811.000	137,1
DISMAC	-	-	-	2.102.000	2.733.000	9.571.000	33.600.000	250,2
TDA	-	-	-	120.000	1.638.000	9.563.730	43.500.000	483,9
UNITRON	-	-	-	91.781	2.740.000	7.450.115	20.000.000	171,9
MICROTEC	-	-	-	1.797	65.000	7.380.600	130.167.400	11.254,8
NOVADATA	-	-	18.000	207.202	1.114.000	6.038.000	23.476.000	442,0
SOFTTEC	-	-	-	-	-	5.835.000	25.000.000	-
SPECTRUM	-	-	-	79.142	515.000	5.509.764	29.000.000	969,9
DIGITEL	0.950	3.100	15.600	122.693	872.721	4.961.000	52.500.000	468,8
METALMA	-	-	-	-	-	4.477.000	30.357.000	-
ELETRODIGI	-	-	-	168.777	1.100.000	4.374.000	22.400.129	297,6
MAGNEX	-	-	-	-	-	4.364.186	60.008.000	-
SPLICE	-	-	17.377	20.867	571.057	1.875.240	4.300.000	578,6
DIGITUS	-	-	-	530.000	963.123	3.320.000	10.000.000	244,7
CCE	-	-	-	-	-	3.255.000	48.940.000	-
EBC	12.584	42.323	114.362	720.084	813.600	3.199.000	5.011.000	293,2
SCRITTA	-	-	-	-	-	3.057.000	16.000.000	-
MENNU	-	-	-	88.000	449.000	2.796.000	17.000.000	522,7
MODDATA	-	55.529	137.302	56.000	199.000	2.606.000	17.938.000	1.209,5
PARKS	12.138	14.293	78.267	180.619	433.000	2.279.000	9.000.000	426,3
CMA	-	4.192	78.095	122.300	185.000	2.137.000	5.000.000	1.055,1
QUARTZIL	-	-	8.750	54.479	1.981.000	2.051.900	10.000.000	3,8
ABC-DADOS	-	-	-	-	-	1.875.000	2.902.000	-
PGM	-	-	-	-	-	1.859.138	18.900.000	-
GEPETO	-	54.829	133.880	187.510	381.108	1.694.000	5.500.000	344,5
MDA	-	-	70.000	210.000	484.000	1.500.000	7.500.000	209,9
APPLETRÔNICA	-	-	-	1.349	134.204	1.336.076	3.072.008	895,6
PERIFÉRICOS	-	-	-	-	-	1.330.000	21.500.000	-
MAQUIS	-	-	-	-	-	1.306.367	4.773.856	-
TELEMÁTICA	-	-	-	-	-	1.220.000	7.855.000	-
CETUS	-	-	-	-	-	1.175.000	13.107.000	-
LOGODATA	-	-	-	-	-	1.132.000	2.000.000	-
LOGUS	-	-	-	-	-	1.031.000	3.500.000	-
ELÓGICA	-	-	-	-	-	717.840	2.395.073	-
VICTOR	-	-	-	-	-	672.000	1.890.000	-
STRATUS	-	-	-	68.686	169.672	591.130	1.800.000	248,4
ZANTHUS	-	-	-	7.716	87.145	555.000	4.500.000	536,9
PERCOMP	-	-	-	-	-	420.000	15.130.000	-
VIDEOTEK	-	-	-	-	35.600	400.000	2.400.000	1.023,6
DIGIBYTE	-	-	-	35.730	61.040	383.380	958.000	528,1
BASIC	-	-	-	-	-	308.980	7.182.000	-
ELETROTELA	-	-	12.576	18.503	67.287	206.000	1.000.000	206,2
AUTO-DATA	-	-	-	-	-	204.236	3.775.770	-
STI	-	-	-	-	-	65.000	1.000.000	-
TROPICAL	-	-	-	-	-	50.000	500.000	-
DIGINET	-	-	-	-	-	32.300	1.279.000	-
MICRO SERVO	-	-	-	-	-	14.900	200.000	-
GLOBUS	29.296	648.311	1.438.898	3.800.000	6.520.000	-	-	-
BRASCOM	-	-	-	180.000	4.043.100	-	-	-
SISTEMA	-	75.000	242.000	555.287	3.626.125	-	-	-
TECNOLOGIA	-	58.000	203.557	428.000	730.000	-	-	-
P & D	-	30.405	68.366	216.500	833.300	-	-	-
SCHUMEC	-	-	9.822	62.000	354.474	-	-	-
METALZILLO	-	-	-	6.700	45.000	-	-	-
CODIMEX	-	-	-	-	30.068	-	-	-
TOTAL	4.678.354	14.076.799	28.608.504	97.233.624	284.288.467	1.261.073.494	5.525.971.483	343,8

Notes: 1 - This table based on the companies that participated in the 1984 survey.

2.- When companies did not provide estimates, their historical growth rates were used.

### Chapter III - Distribution of Sales

Following the procedure adopted in the previous survey, the analysis of the distribution of sales is divided into three parts. First, a study of the distribution of sales among the various marketing methods, then a look at the classification by type of customer and finally, a discussion of the geographical distribution of sales.

Once again, all the companies that participated in the survey responded to this item.

#### 3.1 - Distribution of Sales by Marketing Method

The different methods of marketing used by the companies in the computers and peripherals segment are enumerated and listed in the following table in terms of their relative importance in total sales.

Marketing Method	Percentage of Sales				
	1980	1981	1982	1983	1984
Direct Sales	47,5	53,1	41,5	41,6	46,9
Indirect Sales	—	—	4,4	8,8	12,0
OEM	18,2	22,5	20,2	16,5	18,6
Leasing	5,0	13,1	28,0	27,0	19,7
Rental	10,3	3,6	5,9	6,1	2,8
Unspecified *	19,0	7,7	—	—	—

\* Changes were made in the survey to eliminate the possibility of supplying "unspecified" data.

Note that the throughout the historical series, the predominant marketing method has been direct sales to the end user, which averaged 46 percent of the total during those years.

In 1984, that method was responsible for approximately 591 billion cruzeiros worth of transactions. Fifteen of the respondent companies reported that from 90 to 100 percent of their business was done through direct sales that year. This is a significant increase in the use of that selling method compared with 1983, when only nine companies showed similar figures for this mode.

The next table lists the companies which used the direct sales method most heavily in 1984. Cobra continues to be responsible for the highest percentage of sales effected by the direct method. On the other hand, because of changes that have taken place in the Itau Group's commercial operations, Itautech--which in 1983 led in business volume realized by rentals--appears in 1984 as the third most important in terms of total volume sold through direct sales, having made 12.4 percent of its sales that way.

Company Name	Direct Sales as a Percent of Total Sales		
	1982	1983	1984
COBRA	38,2%	27,6%	19,1%
DIGIREDE	0,9%	3,2%	13,6%
ITAUTEC	1,0%	2,0%	12,4%
PROLÓGICA	4,4%	4,6%	9,1%
SID	5,3%	8,7%	5,8%
TOTAL	49,8%	46,1%	60,0%

The companies that made the greatest use of indirect marketing are listed in the following table:

Company Name	Indirect Sales as a Percent of Total Sales		
	1982	1983	1984
PROLÓGICA	57,6%	46,0%	36,5%
SCOPUS	11,2%	4,5%	9,6%
MICRODIGITAL	8,2%	11,5%	9,0%
ITAUTEC	—	—	7,1%
MICROTEC	—	—	4,8%
TOTAL	77,0%	62,0%	67,0%

The trend toward growing importance of indirect sales seen in 1983 became definite in 1984 when the percentage of sales made in that manner reached 12 percent of the total.

A growing number of establishments are specializing in the sale of computers and peripherals, and the trend toward the sale of microcomputers in department stores is gaining momentum.

Prologica continued, during the period under review, to be not only the heaviest user of indirect marketing. It also had the highest number of representation offices throughout Brazil--194 of them, the company reported.

Of the 39 companies reporting that they use indirect marketing method, 6 have adopted it almost exclusively: Logodata, Scritta, Unitron, Auto-Data, Microdigital, and Microtec. The last three did all their business by indirect sale. Note that most of the companies mentioned above are microcomputer manufacturers.

The OEM mode has been the third most popular marketing method during the 5-year period. In 1984, it accounted for approximately 12 percent of total sales.

Twenty-nine companies in the sample reported that they make OEM sales; most of the 14 that use predominantly that method are in the peripherals segment.

The following table indicates OEM sales as a percentage of total sales for five of the companies.

Company Name	OEM Sales as a Percent of Total Sales		
	1982	1983	1984
ELEBRA INF.	32,9%	19,8%	25,2%
MICROLAB	12,5%	15,7%	12,9%
FLEXIDISK	7,2%	12,1%	10,6%
MECAF	—	—	6,1%
EXPANSÃO	—	—	5,9%
TOTAL	52,6%	47,6%	60,7%

The companies listed above are all peripherals manufacturers and were responsible for approximately 143 billion cruzeiros in OEM sales during 1984.

Although leasing has ranked second in terms of sales volume, 1984 saw a decline in that type of operation. The importance of leasing in relation to total sales by selected companies is shown in the table at the top of the next page.

Company Name	Leasing as a Percent of Total Sales		
	1982	1983	1984
SID	15,7%	26,8%	37,2%
COBRA	23,1%	19,1%	22,7%
LABO	15,0%	17,2%	15,2%
EDISA	—	—	8,6%
SISCO	10,6%	8,7%	5,1%
TOTAL	64,4%	71,8%	88,8%

The five companies in the above table are the most important participants in this selling method and identified themselves as minicomputer manufacturers. It should be pointed out that these companies account for approximately 89 percent of total computers and peripherals moved under leasing.

Rentals declined as a percentage of total sales during the year under study, dropping from 6.1 percent in 1983 to 2.8 percent in 1984. The decrease is due in part to the fact that Itaotec, the biggest user of this marketing method in 1983, changed its product distribution procedures and made substantial volumes of direct sales in 1984.

It should be noted, however, that even considering those changes and thus the considerable decrease in total rentals for 1984, Itaotec still accounts for the largest share of business done in the form of rentals--36.7 percent.

The companies that are the prime users of this type of product marketing are shown in the following table.

Company Name	Rental as a Percent of Total Sales		
	1982	1983	1984
ITAUTEC	—	43,0%	36,7%
SID	12,4%	20,0%	21,2%
LABO	48,4%	14,0%	15,6%
PROLÓGICA	25,0%	5,4%	6,9%
EDISA	5,5%	7,8%	3,4%
TOTAL	91,3% *	90,3%	83,8%

\* Corrected Figure



Studying the above table, we find that Sid utilized rentals to move 21.2 percent of its computers and peripherals, while Labo rentals were 15.6 percent of its sales, Prologica's 6.9 percent, and Edisa's 3.4 percent. Edisa cut its use of rentals by about half, doing the bulk of its business through leasing.

For most of the Brazilian companies in the sector, the shortage of working capital was an obstacle to the use of rental to move their products. Only those firms that have the backing of major financial groups were able to overcome this problem.

It should be kept in mind that usually the companies engage in more than one type of marketing. This is demonstrated in Table III, which follows this section.

The following table permits us to see, for the period 1980-84, the number of companies that adopted each of the marketing methods analyzed in this part of the report.

Marketing Method	1980	1981	1982	1983	1984
Direct Sale	23	29	45	47	58
Indirect Sale	—	—	12	22	39
OEM	15	19	21	22	29
Leasing	6	12	22	25	32
Rental	7	10	12	15	20

The distribution of sales among the five methods of marketing is presented in Figure III-1.

### 3.2 - Distribution of Sales by Type of Customer

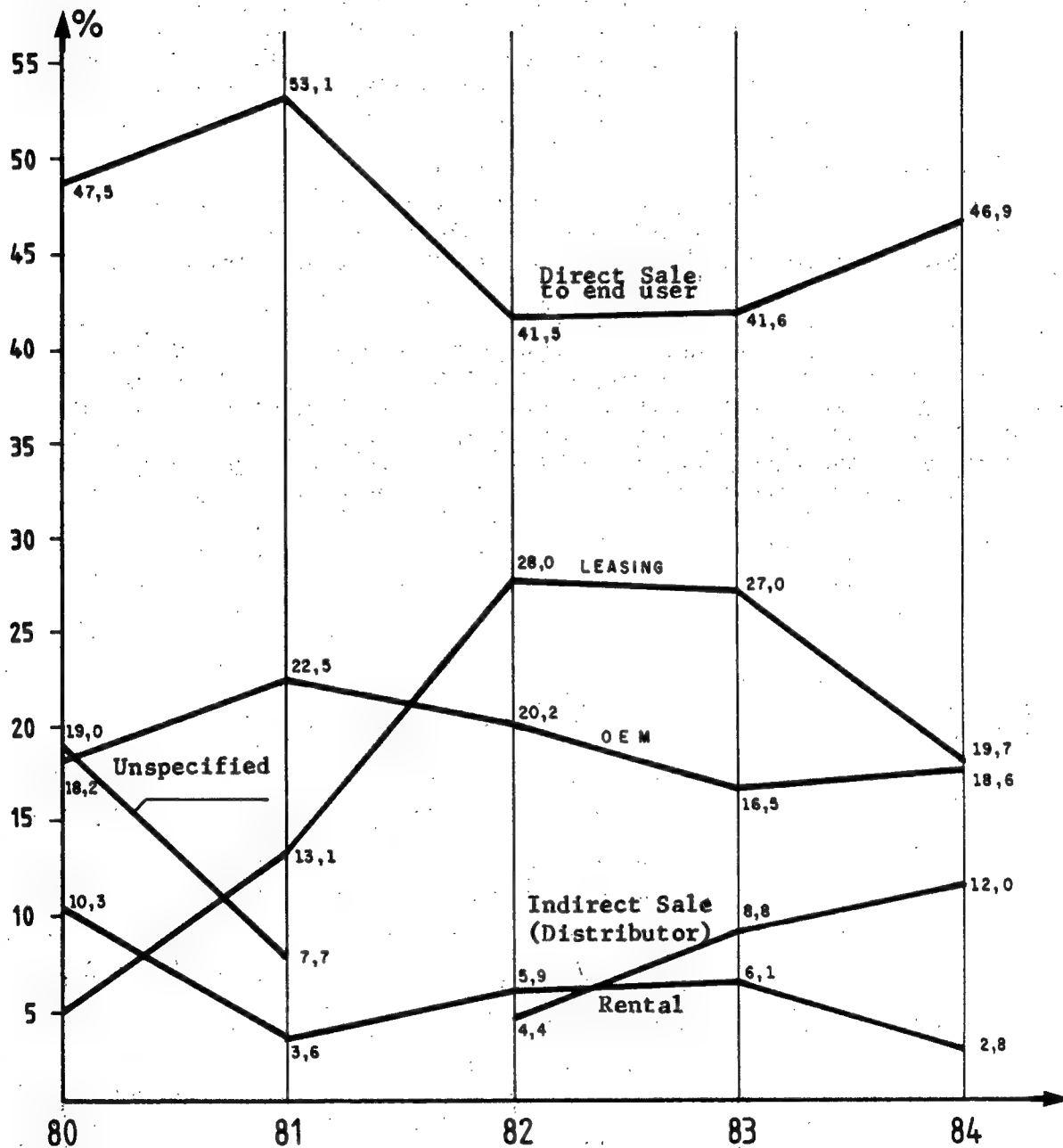
Some modifications were made in the classification developed for purposes of the analysis of the 1984 distribution of sales by type of customer. The ultimate objective was to achieve greater clarity concerning the end user's branch of economic activity.

This survey divided economic activity into six categories: government, commerce, industry, the public financial sector, the private financial sector, and services. This means that two categories underwent a change of definition. For purposes of this survey, "government" was considered as the agencies of the direct administration, the autonomous public entities, the supervised foundations, and the government-owned companies. All three

Figure III - 1

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Distribution of Sales By Marketing Method



DEM / SEP / SEI

Table III

[illegible]

\* Corrected Data

levels--federal, state, and municipal, were included, as were the units in the legislative and judiciary branches at their respective levels. The mixed-economy companies are also classified under the heading of "government." The public financial sector is considered to be composed of the banks and other government-controlled financial entities at their respective levels.

Because of the degree of aggregation of the data for 1983, it was impossible to match up the information from the earlier survey with the new classification by type of customer. This level of aggregation kept us from drawing precise conclusions as to the behavior of the end user during 1984.

Using the information from the manufacturers, it was possible to prepare the following table on the distribution of sales according to the category of economic activity in which the end user was engaged.

User Economic Activity Category	1980	1981	1982	1983	1984
Government	17,7	15,9	11,9	9,0	13,1
Commerce	34,5*	37,9*	19,6	16,8	19,4
Industry	26,2	25,6	29,1	28,2	27,7
Public Financial Sector	—	—	—	—	11,7
Private Financial Sector	20,7**	19,4**	29,6**	30,4 **	17,8
Services	—	—	9,8	15,6	10,3

\* Includes Services

\*\* Includes the public financial sector

Confirming the trend observed in 1983, the financial sector as a whole continued to account for the greatest percentage of total sales--29.5 percent in 1984. The process of banking automation has been responsible for the tremendous relative weight of this end-user category.

However, the public financial sector was a less important user, in percentage terms, than the private financial sector. Government banks and financial entities are not yet fully committed to automating their services. We should mention at this point that the 1980-83 data for the financial sector refers mainly to the private financial sector.

Three companies together--Sid, Digirede, and Itaútec--account for approximately 69 percent of total sales to the private financial sector. It is worth noting that Sid has won about one-third of this market.

As regards sales to the public financial sector, Cobra is the leader, with about 26 percent of total sales. The other three important suppliers to this category are Racimec, with 17.9 percent; Sid, with 15.7 percent; and Digirede, with 13.7 percent of total sales.

The industrial sector has been maintaining its important position in the market, holding an average share in the neighborhood of 27 percent throughout the 5-year period under study. In 1984, the industrial sector was the best customer for the computers and peripherals segment of any of the five economic categories covered by this survey.

The five leading suppliers to industry during the period under review are: Elebra Informatica, Flexidisk, Labo, Microlab, and Sid. Comparing this group with the list of major companies during 1983, we find that there has been no change except the inclusion of Flexidisk and the exclusion of Globus.

The commercial sector experienced a significant increment in its share of total sales, which rose from 16.8 percent in 1983 to 19.4 percent in 1984. Prologica stands out as the leading supplier to this sector, with about 26 percent of the sales.

As is evident in the table under discussion, sales to government entities have increased substantially, reaching 13.1 percent of total sales in 1984. However, it was impossible to draw any clear conclusions as to the reason for this. The phenomenon could be associated with the new definition adopted for the "government" category. It is worth recalling that beginning with this year's survey, the mixed-economy companies are classified under the heading of "government."

Cobra continues to be the company that sells the most to the government, accounting for approximately 32 percent of the sales to this market.

The services category, which had been posting significant increases over the years in its percentage share of total sales, showed a decrease in the year under study, dropping from 15.6 percent to 10.3 percent. Four big companies account for 72 percent of total sales to this branch: Cobra, Itaotec, Labo, and Sisco. Cobra, with about 26 percent of this market, is particularly important.

### 3.3 - Geographical Distribution of Sales

In this section we shall study the geographical distribution of sales from two different approaches, i.e., the sales on the domestic market and the sales to customers outside Brazil.

### 3.3.1 - The Domestic Market

As was done in the previous study, the analysis of this item was based on the respective percentages for each unit of the Brazilian federation--as reported by the companies who took part in the survey--in relation to their total sales for the year. Once again, all 71 respondents answered the questions on this topic.

The geographical distribution of sales on the domestic market during the past 6 years is presented in the following table.

States	Percentage Share of Total Sales					
	1979	1980	1981	1982	1983	1984
São Paulo/Capital	39.4	42.7	41.6	33.7	31.3	37.1
Rio de Janeiro	29.1	33.2	29.6	24.5	26.4	20.3
São Paulo/Interior	-	-	-	6.5	15.1	11.0
Distrito Federal	8.8	5.4	7.4	10.8	5.2	6.5
Paraná	-	4.2	5.1	4.0	4.3	5.8
Rio Grande do Sul	4.8	7.1	8.2	9.0	5.3	5.2
Minas Gerais	-	2.7	2.7	3.9	4.7	4.3
Other States *	17.9	4.7	5.4	2.3	1.9	3.6
Bahia	-	-	-	1.5	1.6	2.1
Santa Catarina	-	-	-	1.0	0.8	1.5
Pernambuco	-	-	-	1.6	1.7	1.4
Ceará	-	-	-	1.0	0.9	1.2

\* Includes Pará, which had a 0.9% share of 1984 sales.

We see that the city of Sao Paulo continues to be the largest domestic market, accounting for 37.1 percent of total sales. Furthermore, its share increased significantly in relation to 1983.

Rio de Janeiro is still the second largest consumer market, although its share declined by about 6 percentage points from its 1983 level.

The current survey indicates that sales along the Rio-Sao Paulo corridor represented 68.4 percent of the total. However, that constitutes a decrease in the total sales made to that market when compared to the results reported in the previous survey. This came about because of the drop in the participation of the markets of Rio de Janeiro and the interior regions of Sao Paulo State.

The substantial increases in the markets of the Federal District (Brasilia and vicinity) and Parana State are worth mentioning. They now rank 3rd and 4th, respectively, among the largest domestic markets. It can be said of the third-ranked Federal District market that the economic recovery which began

in 1984 and the expansion of government purchases had a particularly positive effect.

Rio Grande do Sul State, for its part, recorded 1984 purchases slightly lower than those of Parana. The Minas Gerais State market also proved to be a significant purchaser, taking 4.3 percent of 1984 sales.

In observing the performance of the various companies, it was found that in general, the bulk of their receipts is obtained from sales made in their home states. This being the case, we have developed the following table to show the extent of participation of manufacturers in sector sales according to their respective states of origin during the period 1980-84, with forecast for 1985.

Year State	1980	1981	1982	1983	1984	1985 (Est.)
São Paulo	39,8	43,1	50,7	61,2	65,8	64,4
Rio de Janeiro	52,2	42,5	36,8	28,2	24,9	24,8
Rio Grande do Sul	5,4	10,9	8,1	6,6	6,3	7,2
	2,6	3,5	4,4	3,9	3,0	3,6
TOTAL	100,0	100,0	100,0	100,0	100,0	100,0

We see from the table that the manufacturers located in Sao Paulo and Rio de Janeiro continue to account for the bulk of the sales--89.4 percent in 1983, and 90.7 percent in 1984. Note, however, that the high percentage recorded in 1984 is due primarily to the growing participation by companies located in Sao Paulo.

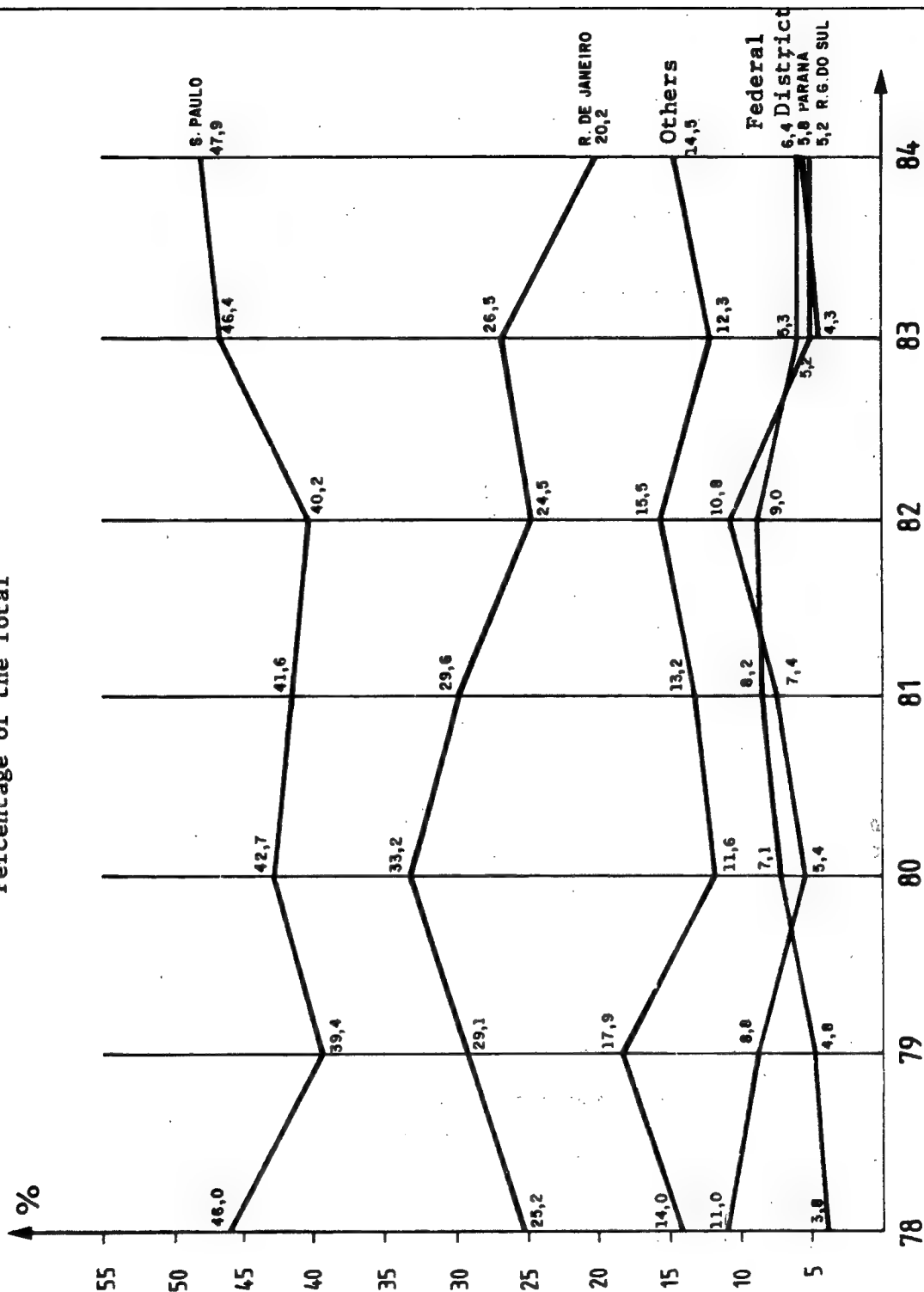
Figure III -2, which follows, illustrates the trend in the geographical distribution of sales made on the internal market.

### 3.3.2 - The Foreign Market

Exports by companies in the computers and peripherals segment amounted to \$5.53 million in 1984, up 367 percent from the previous year's level. The forecast for 1985 puts such exports at \$11 million.

Sales abroad concentrated on microcomputers, peripherals, and other devices. It should be emphasized that Brazilian exports in this sector still are not very significant and do not yet exhibit any stable pattern in terms of

Geographic Distribution of Sales  
Percentage of the Total



DEM / SEP / SEI



destination. This is borne out by the fact that exports to the United States are expected to drop from 73.2 percent of the total in 1984 to 7.2 percent in 1985. The same is true of the percentage distribution among exporters.

The following table lists the products exported in 1984.

<u>Exporter</u>	<u>Share of Total Exports</u>	<u>Products Exported</u>
Elebra Informatica	73.2%	Serial Printers
Microdigital	15.2%	Printed Circuit Boards
		Microcomputers, Programs,
		Technical Documentation,
		Peripherals
Elebra Telecon	2.9%	Modems
Racimec	2.9%	Special terminals for lotteries
Novadata	2.5%	Microprogrammers
Sid	1.4%	Banking automation systems
		Concentrators, Terminals
Digital	0.6%	Modems
		Other equipment and accessories
Menno	0.4%	Magnetic cards
Unitron	0.3%	Microcomputers & accessories
Softec	0.2%	Microcomputers
Stratus	0.2%	Printers
Microtec	0.1%	Microcomputers
Digiponto	0.1%	Keyboard components & parts
EBC	*	Video terminals
TOTAL	100%	

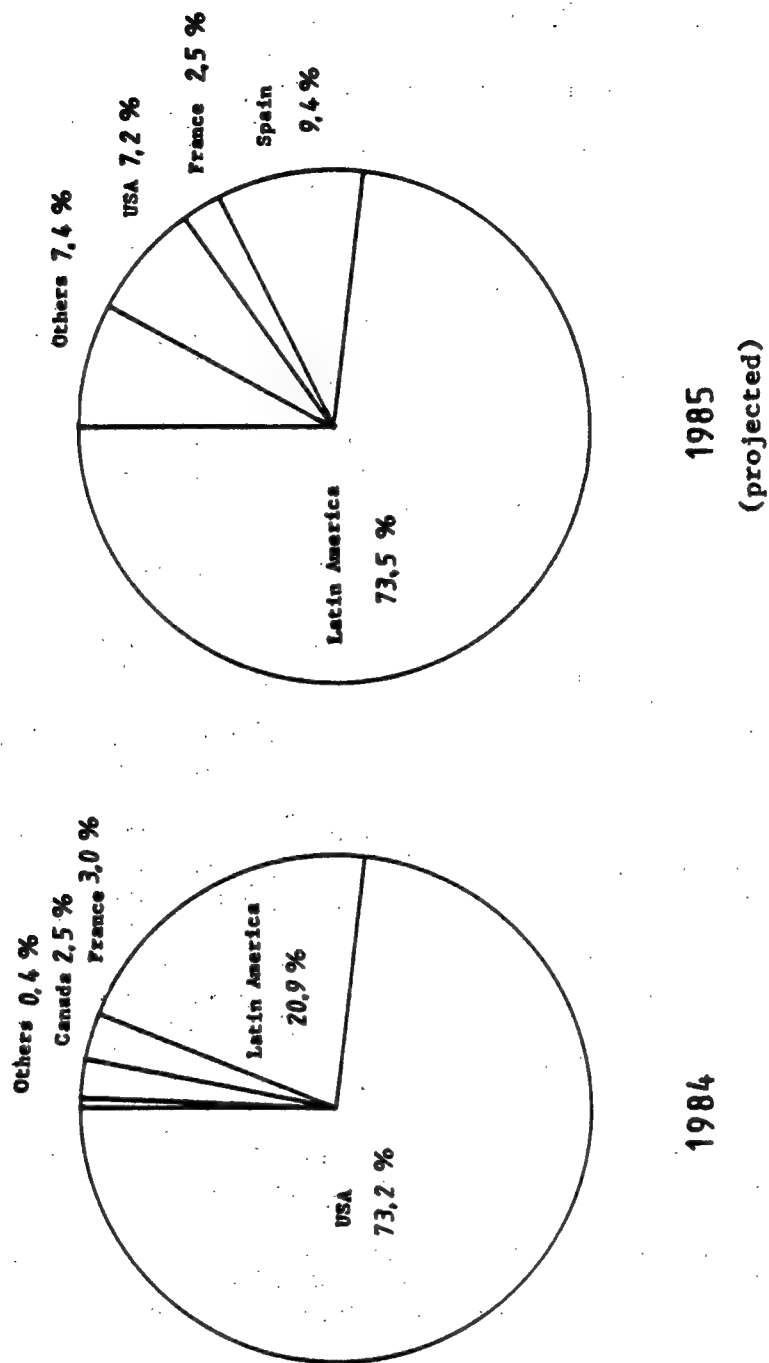
\*Percentage less than 0.1%

Figure III - 3

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### EXPORTS

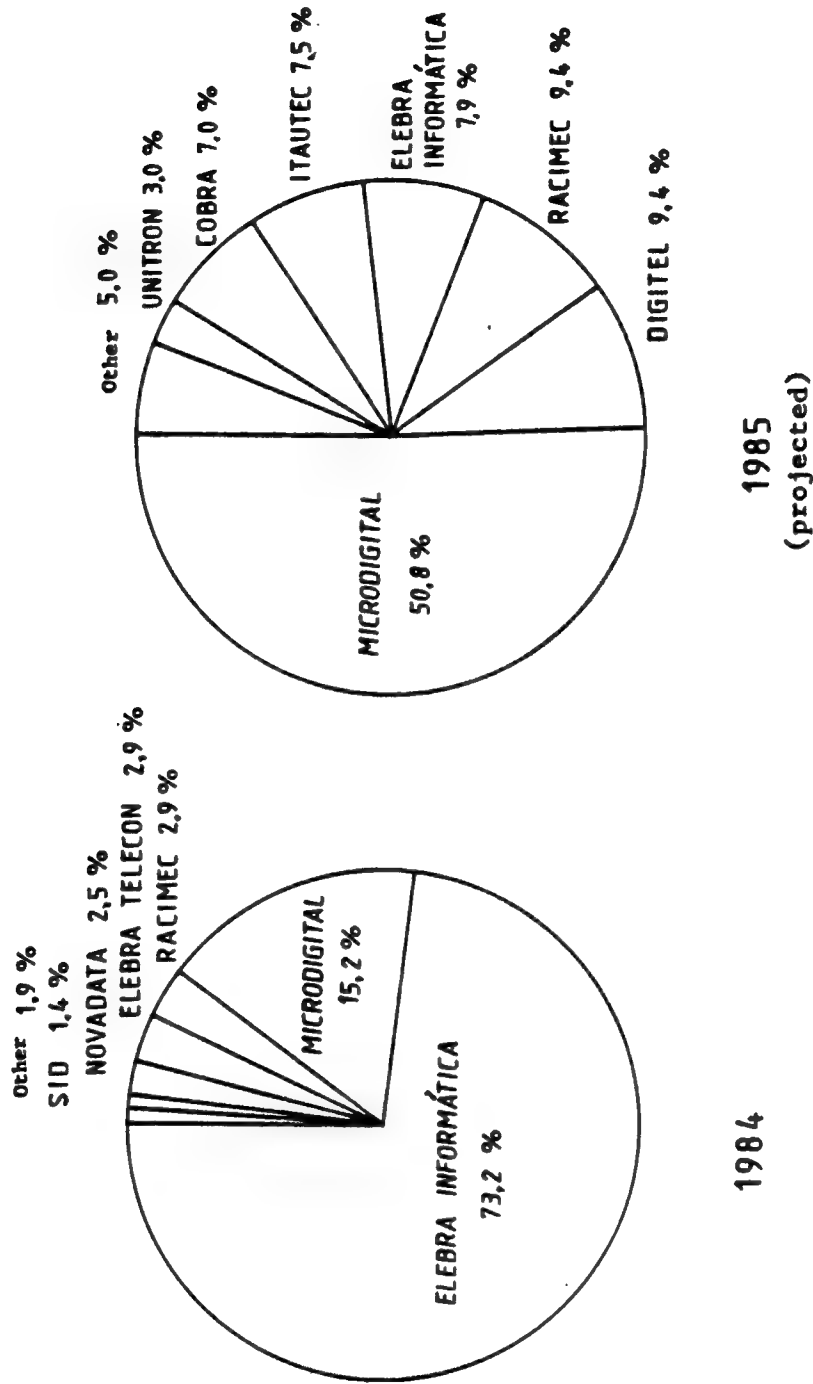
#### Distribution of Exports by Destination



DEM / SEP / SEI

EXPORTS

Distribution of Exports By Manufacturer



## Chapter IV - Product Distribution Channels

This chapter discusses the home states of the companies that participated in the survey and then reports on the product distribution channels most used by these computer and peripherals manufacturing companies.

The following table illustrates the location of these companies. Note that 77 percent of them are concentrated on the Rio-Sao Paulo corridor.

<u>State</u>	<u>No. of Companies</u>
Sao Paulo	40
Rio de Janeiro	15
Federal District	03
Minas Gerais	03
Rio Grande do Sul	07
Amazonas	02
Pernambuco	01
<b>TOTAL</b>	<b>71</b>

Of the 71 companies that took part in the study, 17 failed to answer the question on number of sales outlets, i.e., number of branches, offices, and representatives.

Following the same methodology adopted in the previous study, and with a view to demonstrating more clearly the outlook for new business in various Brazilian cities, the information provided by the companies concerning their channels of distribution was grouped by region. The result was the following table, which shows the number of branches, offices, and representatives per region for 1983 and 1984.

Number of Branches, Offices, and Representatives, by Region													
Region		Southeast		South		West Central		Northeast		North		Total	
Type of Outlet	Year	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984	1983	1984
Branches		64	75	33	35	11	13	13	17	1	1	122	141
Offices		47	77	31	18	8	9	15	8	5	3	106	115
Representatives		190	336	75	156	39	81	55	94	32	37	391	704
Totals		301	488	139	209	58	103	83	119	38	41	619	960

From the data in the above table, we see that the South and the Southeast have the greatest number of outlets; 73 percent of the total in 1984. This confirms the importance of the consumer market in those two regions, which account for 22 percent and 51 percent, respectively, of all the outlets in Brazil. In comparison, the Northeast has 12 percent, the West Central area 11 percent, and the North 4 percent of the total branches, offices, and representatives that have been established.

The information supplied by the respondents indicates that representatives have been the distribution channel most used during the two years under review, and that a good part of these outlets--48 percent, in fact--are concentrated in the Southeast.

The total number of representatives rose sharply in 1984 to a level 80 percent above that of 1983. Of all the companies participating in the sample under analysis, Prologica is still the leader in terms of number of sales representatives set up. Its 194 representatives are concentrated in the Southeast, where 93 are located. There are 39 in the South, 33 in the West Central region, 23 in the Northeast, and six in the North.

Branches have ranked second among sales outlets used by the respondent companies in the 1982-84 period. The number of branches set up has tended to rise since 1982.

Offices, although they are the type of outlet least used by our respondents, have also increased in numbers between 1982 and 1984.

The distribution of branches, offices, and representatives among geographical regions during 1983 and 1984 is illustrated in the following table.

Percentage Distribution of Branches, Offices, and Representatives, by Region													
Region		Southeast		South		West Central		Northeast		North		TOTAL	
Type of Outlet	Year	1983 1984		1983 1984		1983 1984		1983 1984		1983 1984		1983 1984	
Branches		52,5	53,2	27,0	24,8	9,0	9,2	10,7	12,1	0,8	0,7	100	
Offices		44,3	67,0	29,2	15,7	7,6	7,8	14,2	7,0	4,7	2,6	100	
Representatives		48,5	47,7	19,2	22,2	10,0	11,5	14,1	13,4	8,2	5,2	100	

## Chapter V - Human Resources

This part of the report focuses on three important aspects of human resources in the informatics industry--the number employed by the companies taking part in the survey, the distribution of employees by educational background, and, lastly, an analysis of the breakdown by type of work performed.

At the end of 1984, the 71 companies in the sample employed 21,840 people, which means that 6,106 new jobs had been created since 1983. The rate of increase from 1983 to 1984 was approximately 39 percent, which is much greater than the 25 percent rise recorded from 1982 to 1983. Once again, we saw a trend toward increased creation of new jobs by the computers and peripherals industry.

It is worth remembering that on the one hand, the Brazilian economy as a whole began a recovery and expansion phase in 1984 and, on the other, that the informatics sector had been showing signs of growth all through the period of recession. It is natural, therefore, that the industry in question would grow at an even faster pace once the economic recovery began.

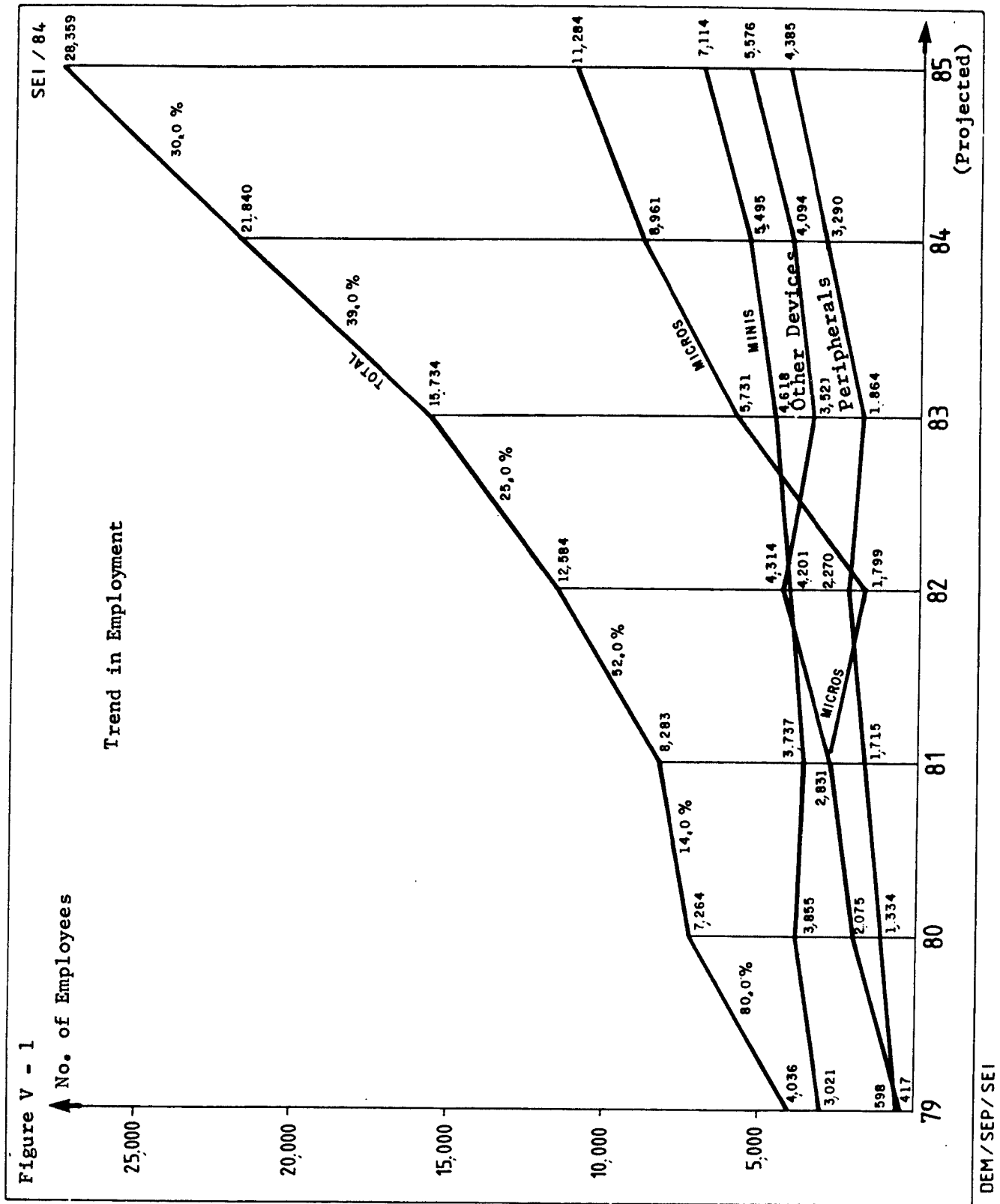
The forecasts made by the companies in the sample anticipate that 1985 employment will total 28,359 employees; thus direct employment would increase by 6,519 new jobs.

We stress that all 71 companies in the sample gave estimates for 1985, which makes the forecast presented here highly representative.

Table V, which appears at the end of this chapter, presents the trend in employment by individual company during the past 6 years, along with percentage changes recorded between 1984 and 1983 and forecasts of each company's expected 1985 employment. According to that table, only one company--Digibyte, experienced zero growth between 1983 and 1984 and only six others cut their personnel, by about 138 people in all. The companies whose work force declined were Splice, Labo, Coencisa, Menno, Conpart, and Quartzil.

The special case of Elebra Telecon (formerly Elebra Eletronica) should also be mentioned at this point. Because of a change in its company name and a reduction in the extent to which workers were exchanged among the other companies of the group, Elebra Telecon's staff dropped by 129 employees in 1984, compared to 1983.

The next chart, Figure V-1, gives a better picture of the trends in employment during the 1979-85 period.



Looking at the historical data series available to us, we see that the average rate of manpower absorption in the sector has been on the order of 40.2 percent during these years.

From the following table we see that 54.8 percent of the employment in 1984 was generated by only 10 companies, and that five of them accounted for approximately 37.5 percent of total personnel. However, because new companies are continually entering the market, the degree to which large contingents of workers are concentrated in a small number of companies has diminished over the years. Still, there is a slight upturn in the percentages the result from the forecasts for 1985.

Companies	1979	1980	1981	1982	1983	1984	1985 (Est.)
5 largest	78.7	58.2	49.0	40.3	38.9	36.5	37.5
10 largest	94.9	77.5	71.9	61.8	58.1	54.8	55.2

Cobra continues to be the sector's largest employer, even though its percentage has fallen gradually from year to year, dropping from 23.9 percent in 1981 to 10.6 percent of total informatics sector employment in 1984.

Compared to its performance in this aspect in 1983, Itauteq reported a significant increase in 1984 in its share of the total work force employed by the sector--from 6.9 percent to 8.9 percent. Prologica also stands out, with about 6.9 percent.

The percentages for the 10 leading employers are listed in the following table.

Share of Total Employment For Each of the 10 Largest Employers	
Company	%
COBRA	10.6
ITAUTEC	8.9
PROLÓGICA	6.9
SID	5.2
ELEBRA TELECON	4.9
DIGIREDE	4.3
SCOPUS	4.2
ELEBRA INFORMÁTICA	3.9
MICROLAB	3.0
CCE	2.9
TOTAL	54.8



The data in the above table show that, except for Elebra Telecon, the five biggest companies in terms of work force are also the five largest in terms of sales.

Itautec merits special mention as the company that absorbed the greatest number of new employees. The next table lists, in descending order, the 10 companies that created the most new jobs in 1984.

Company Name	No of New Employees in 1984
ITAUTEC	855
ELEBRA INFORMÁTICA	684
PROLÓGICA	493
DIGIREDE	430
MICRODIGITAL	339
COBRA	330
SID	297
DIGILAB	158
DIGIPONTO	147
FLEXIDISK	122
TOTAL	3,855

Note that six of the 10 companies that generated the most new jobs in 1984 rank among the biggest in the sector in terms of sales.

The trend in the distribution of employees by educational level during the period 1979-84 is presented in the following table:

Distribution of Employees by Educational Level - 2							
Educational Level	1979	1980	1981	1982	1983	1984	1985
Primary	12	12	14	20	21,2	17,2	17,0
Secondary	50	50	51	48	50,1	55,7	55,0
University	38	38	35	32	28,7	27,1	28,0

We see that more than half of all employees in the computers and peripherals sector have completed high school. The estimates for 1985 indicate no change in this figure from that of 1984, which was 55 percent.

Throughout the historical series, the share of employees having university or other type of higher educational background has been greater than the percentage having only a primary-school education. Nevertheless, in order to progress, the informatics sector needs more and more highly-skilled personnel. During the past 6 years, the proportion of college-educated employees employed in the sector has averaged about 30 percent, far below industry needs. The shortage of qualified workers has been one of the continuing problems cited by the manufacturers.

In comparison with 1983, the proportion of personnel having a primary-school education declined in 1984, to 17 percent of total sector employment.

The additional information presented in the next table enables us to draw more precise conclusions concerning educational levels. The table shows the distribution of the work force in 1984 by type of work performed and educational level. We have held to the job classification categories used in previous surveys, i.e., production, administration, product development, human resources development, technical assistance, and sales and marketing.

No of Employees	Type of Work Performed	Educational Level (%)		
		Primary	Secondary	University
12.0	Sales & Marketing	1.9	43.2	54.9
19.6	Administration	11.3	64.3	24.4
39.9	Production	35.1	55.5	9.4
12.9	Tech. Assistance	3.3	75.2	21.5
13.6	Product Development	1.0	35.9	63.1
2.0	Human Resources Development	11.3	55.9	32.8

Production has led in absorbing employees entering the sector between 1980 and 1984, and its share is increasing. In the year under review, production accounted for about 40.2 percent of jobs, and the bulk of the personnel involved are, essentially, those with a secondary or primary education. In 1984, there were 4,839 high-school graduates working in production and 3,057 employees with a primary education.

The proportion of employees working in administration suffered a slight decline, from 21.0 percent in 1983 to 18.5 percent in 1984. This type of work is done in large part by high-school graduates, who represent about 62.4 percent of the total work force.

The proportion of workers engaged in product development rose only slightly during the year under analysis, from 13.0 percent in 1983 to 14.5 percent the following year. This reflects the degree of difficulty manufacturers have in recruiting qualified people. This job category involves the highest number of personnel with university or other higher-level education--1,874 employees in 1984.

Outlays for research and development have been one of the parameters used in evaluating the degree of importance of product development work. Data on R&D expenses were obtained from the manufacturers and refer to funds actually invested in the development of new products and/or the improvement of existing products. So defined, these expenses totalled about 135 billion cruzeiros in 1984, corresponding to 10.8 percent of the total sales by the general-use data processing equipment segment, calculated on the basis of 64 manufacturers. This percentage, when compared to the 9.8 percent in 1983, exhibits a slight increase. However, it is still rather low when we consider that to develop properly, the informatics sector needs to make a concentrated research effort that will result in a further technological development. Beginning in 1986, with the implementation of Article 21 of Law 7,232/84, the companies will have an incentive to invest substantial sums in R&D.

Some respondents found it difficult to break out their expenses for R&D for this survey, because the outlays have been dispersed within the cost structure. The companies which did not answer this question for 1984 were Appletronica, Cetus, Logodata, Magnex, Spectrum,, Stratus, and STI.

Those which spent the most on R&D in 1984 were Sid (28 percent of the overall total invested in R&D); Digirede (25 percent); and Itautech (6.7 percent).

As regards forecasts of 1985 R&D expenditures, neither Sid, nor Electrodigi, nor Flexidisk, nor Mecaf gave estimates. Multidigit gave a partial figure covering only the first half of 1984. Therefore, none of these companies was considered in our projections. Bearing this in mind, we expect that R&D expenditures could correspond to 8.9 percent of anticipated sales for 1985.

The following table enables us to see which segments of the informatics sector made the greatest investment in R&D, in terms of percent of sales.

<u>Informatics Sector Segment</u>	<u>Average % of Sales Invested in R&amp;D</u>
Minicomputers	10.9%
Microcomputers	15.9%
Peripherals	5.2%
Modems	6.1%
Other Devices	5.8%

We find that the proportion invested in R&D by the microcomputers segment of the industry rose from 12.2 percent in 1983 to 15.5 percent in 1984. This was due, in part, to the development and manufacture of the 16-bit micros.

Another type of activity in which a high percentage of college-educated personnel have been involved is human resources development, where 55.9 percent of the personnel employed have a background of higher education. Still, personnel work occupies only about 2 percent of sector employees.

Fifty of the respondent companies reported their manpower training expenses, which totalled 8.3 billion cruzeiros in the year under review. Of that amount, 83.9 percent was spent on training conducted in-house by the manufacturers themselves, while the remaining 16.1 percent was spent on training given by other institutions. Digilab and Elgin led in spending on training expressed as a percentage of all monies spent on human resource development--23 percent and 12.9 percent, respectively.

Although recent years have seen sales and marketing gain in importance because competition has become more intense, this activity did not absorb many a much greater proportion of the labor force in 1984 than it did in 1983--12% of total workers, as compared with 12.7%.

It was found that, beginning in 1984, more college-educated employees than high school graduates were being assigned to sales and marketing. This might reflect a growing demand for skilled manpower because of the strategic importance which this type of work has acquired in today's highly competitive market.

Technical assistance work absorbed about 12.9 percent of the total number of workers, which is a larger share than in the previous year. About 75.2 percent of the work force assigned to this activity--2,118 employees in 1984--have a high school education.

Technical assistance also occupied a significant percentage, about 21.5 percent, of the better-educated labor force. We found, however, that in the year under review the participation of college-educated workers engaged in this type of work declined, while that of the high school graduates increased. This could be a consequence of the various technical courses offered by the companies themselves or other institutions; it could also be that private training organizations have been doing a better job in training the secondary-school graduates.

The estimates for 1985 of the number of employees by job category and educational background are presented in the table on the next page. The graphs (Figures V-2 and V-3) on the two subsequent pages illustrate the manpower data discussed so far.

No of Employees	Type of Work Performed	Educational Level (%)		
		Primary	Secondary	University
12,0	Sales & Marketing	1,6	44,2	54,2
18,5	Administration	11,5	62,4	26,1
40,2	Production	34,9	55,1	10,0
12,9	Technical Assistance	3,5	75,4	21,1
14,5	Product Development	0,7	35,4	63,9
1,9	Human Resources Development	7,3	58,1	34,6

Using the same methodology as in the previous study, we have developed the following table on the basis of the data collected on personnel assigned to the sales and technical support staff at the parent companies, branches, offices, and sales representation units.

Year		1984				1985 (estimate)			
Function Region		Salesmen	Software Technicians (Sales Support)	Hardware Technicians (Maint.)	TOTAL	Salesmen	Software Technicians (Sales Support)	Hardware Technicians (Maint.)	TOTAL
Southeast		893	718	1,389	3,000	1,178	924	1,665	3,767
South		254	148	339	741	334	187	448	969
West Central		90	61	156	307	126	93	177	396
Northeast		108	75	180	363	129	98	228	455
North		58	29	72	159	58	40	88	196
TOTAL		1,403	1,031	2,136	4,570	1,835	1,342	2,608	5,783

In analyzing the above data, we see that the bulk of salespersons and technical support personnel--about 65.5 percent of the reported total--is concentrated in the Southeast. This reflects the influence of the marketing activities in that region; even though such influence has been gradually diminishing. Therefore, we are seeing a concurrent increase in the importance of other regions of the country as regards marketing.

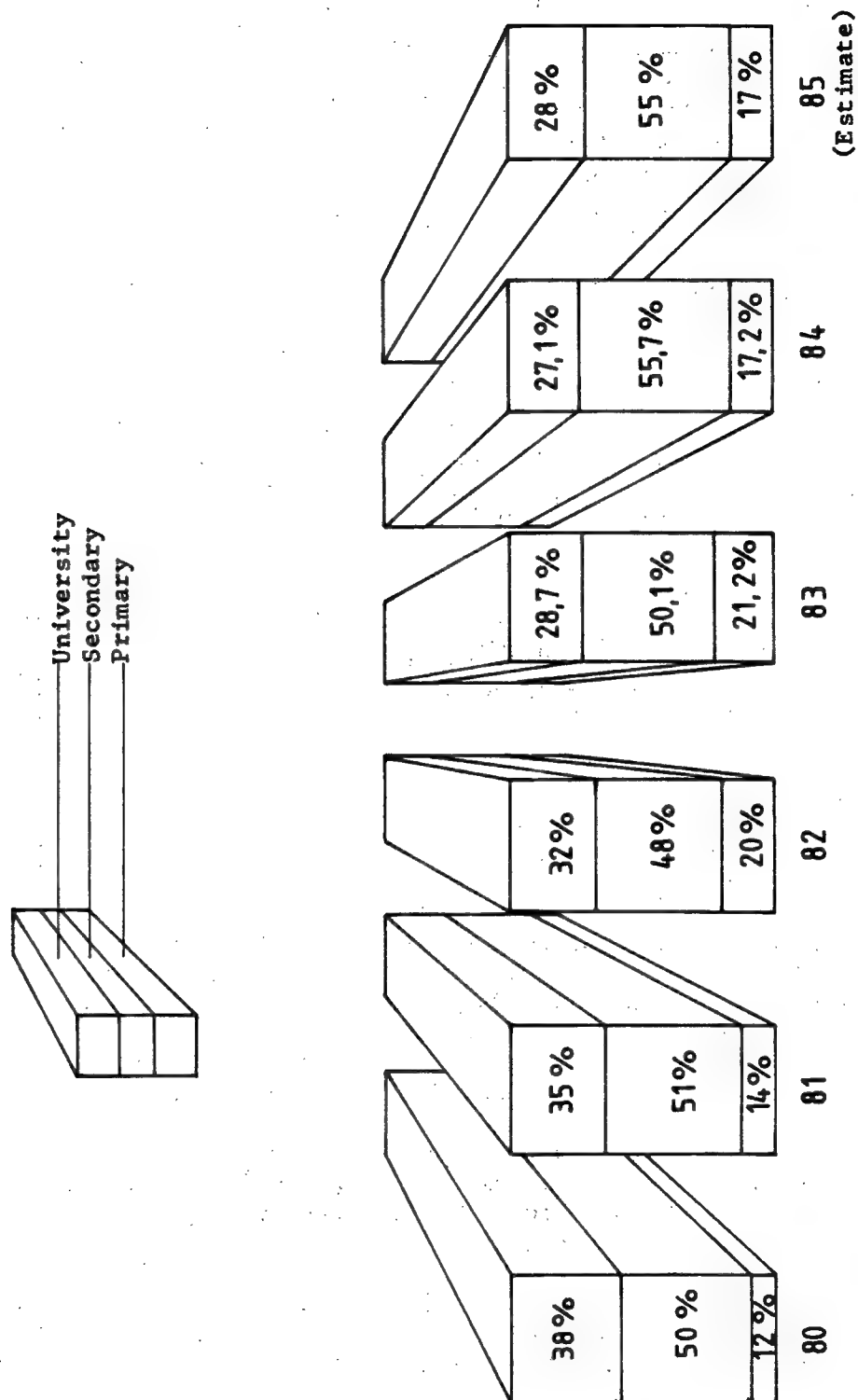
Although we have seen that domestic manufacturers are concerned about maintenance of their equipment, since 46.7 percent are hardware technicians, we found in the period under review that there was a greater increase in the personnel assigned to sales functions.

In 1984, the number of sales people rose by 51.5 percent over the 1983 level, so that salesmen represented about 30.7 percent of the total sales and technical support staff reported by the respondent companies for the year under review.

Figure V - 2

SEI/84

# Distribution of Manpower by Educational Level

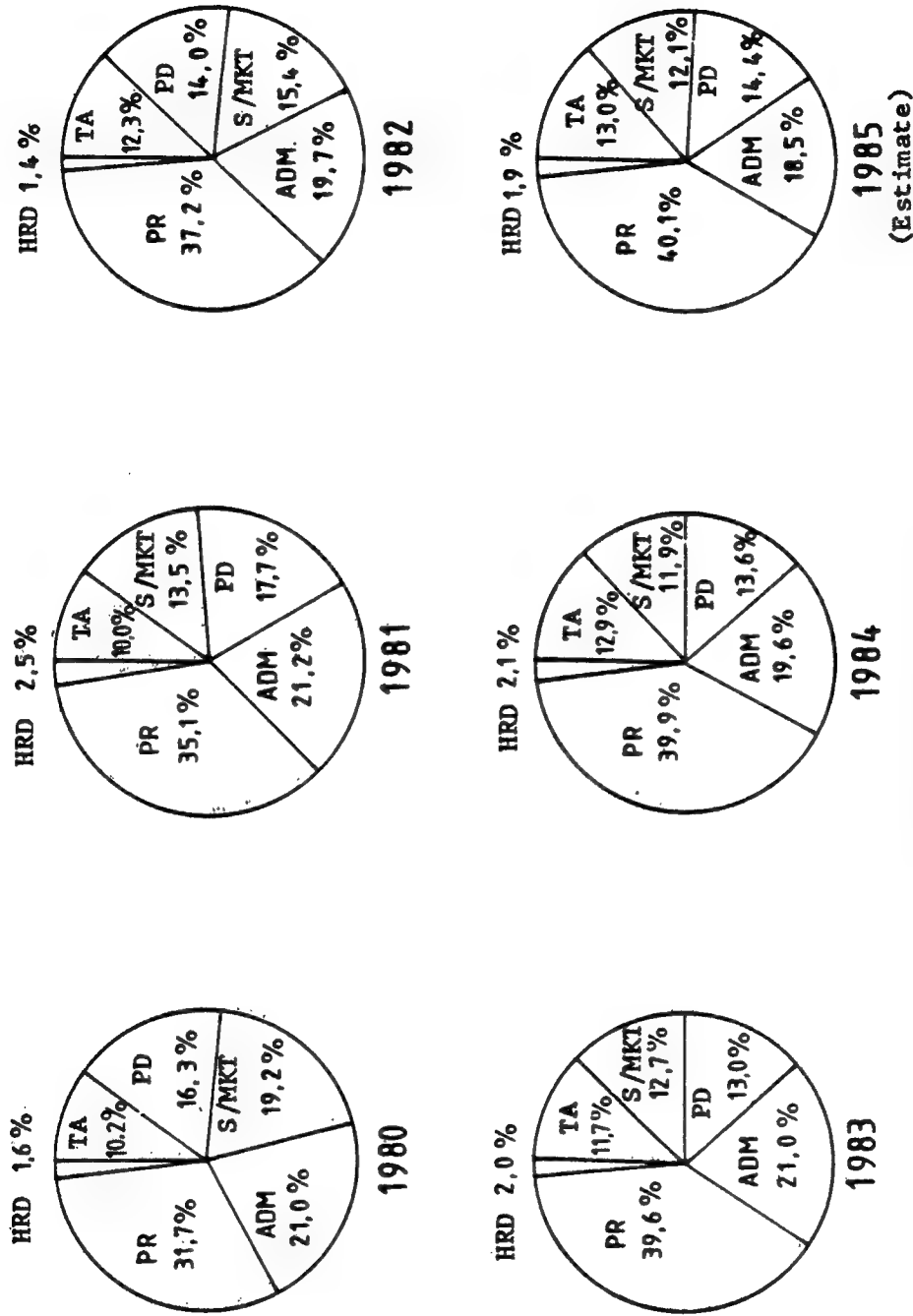


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Figure V - 3

Distribution of Manpower by Type of Work Performed

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HRD - Human Resources Development  
 TA - Technical Assistance  
 S/MKT - Sales & Marketing  
 PD - Product Development  
 ADM - Administration PR - Production

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The so-called software technicians, i.e., the people who perform functions in support of the sale of equipment and software to the customers, maintained their share of about 22 percent of the total number of sales and technical support staff.

The companies that report the largest number of employees in each of the three categories: salesmen, software technicians, and hardware technicians, are listed in the following table.

Salespersons		Software Technicians (Sales Support)		Hardware Technicians (Maintenance)	
Company Name	No of Employees	Company Name	No of Employees	Company Name	No of Employees
PROLÓGICA	260	SID	160	COBRA	457
POLYMAX	153	PROLÓGICA	158	ITAUTEC	310
DISMAC	111	POLYMAX	123	SID	138
SID	97	EDISA	107	POLYMAX	113
SISCO	96	COBRA	93	RACIMEC	110

Note that, except for Polymax, Edisa, and Dismac, all the companies listed in the above table belong to the group of 10 sales leaders for the year in question. On the basis of the data supplied by the respondent companies, we determined that the sales and technical support staff of certain companies dominates in certain regions, which can best be seen in the following table:

Region	Company Name	Percentage of Salespersons & Technical Support Personnel
Southeast	PROLÓGICA	17,4%
	COBRA	14,4%
Northeast	COBRA	27,3%
	SID	13,5%
North	DISMAC	18,2%
	POLYMAX	15,7%
West Central	ITAUTEC	15,1%
	COBRA	17,6%
South	DISMAC	17,6%
	COBRA	15,8%
	POLYMAX	11,3%
	ITAUTEC	10,3%



Only one company (Gepeto) did not supply information on wage and benefits expenses. The 70 others reported having spent approximately 263 billion cruzeiros in 1984, that is, approximately 21 percent of that year's total sales by the computers and peripherals industry. This represents an increase of about 293 percent in relation to salary and benefits outlays for 1983.

A group of 10 companies accounted for about 67 percent of the total wage and benefit costs for the sector. They are: Cobra, Itaotec, Prologica, Sid, Soopus, Elebra Telecon, Labo, Sisco, Digirede, and Elebra Informatica.

Table V

SEI/84

Company	Number of Employees per Company							% Change 83/84
	1979	1980	1981	1982	1983	1984	(Est.) 1985	
COBRA	1.753	2.002	1.954	1.858	1.975	2.305	3.146	16,7
ITAUTEC	57	105	438	777	1.085	1.940	2.333	78,8
PROLOGICA	50	191	213	464	1.013	1.506	2.050	48,7
SID	700	762	451	693	838	1.135	1.600	35,4
ELEBRA TELECON	-	647	635	948	1.207	1.078	1.507	-10,7
DIGIREDE	-	-	70	340	520	950	1.200	82,7
SCOPUS	288	422	518	780	839	914	1.145	8,9
ELGIN	-	-	32	51	109	120	130	10,1
ELEBRA INF.	54	216	247	137	178	860	1.088	388,6
MICROLAB	206	350	470	722	542	847	800	19,4
CCE	-	-	-	-	-	840	783	-
SISCO	230	333	385	454	516	625	715	21,1
DISMAC	-	-	-	1.100	532	620	693	16,5
RACIMEC	-	-	250	500	520	600	800	15,4
EDISA	129	291	368	468	521	599	656	14,9
DIGIPONTO	-	-	-	-	-	539	661	-
POLYMAX	-	193	259	339	487	532	542	9,2
SPLICE	-	-	-	502	590	530	700	-10,2
MICRODIGITAL	-	-	5	85	160	499	603	211,9
LABO	180	392	481	532	505	498	565	- 1,4
DIGILAB	25	66	121	185	192	347	578	80,7
COENCISA	189	218	191	220	321	301	285	- 6,2
FLEXIDISK	-	18	28	68	150	272	305	81,3
MENNO	-	-	-	243	267	250	280	- 8,4
PARKS	99	120	153	199	214	248	300	14,9
MODDATA	-	79	108	156	151	220	315	45,7
MEDIDATA	29	75	98	131	168	217	285	29,2
EXPANSÃO	-	-	-	-	-	201	235	-
DIGITEL	14	13	21	58	93	196	350	110,7
TOA	-	-	-	34	141	193	310	36,9
CONPART	-	53	76	150	198	177	251	-10,6
MAGNEX	-	-	-	-	-	177	235	-
MECAF	-	-	-	-	-	160	169	-
MULTIDIGIT	-	9	19	39	58	124	163	113,8
NOVADATA	-	38	47	65	95	116	147	22,1
QUARTZIL	-	31	36	46	111	98	78	-11,7
ABC	-	-	-	-	-	95	175	-
ELETRODIGI	-	-	-	6	80	94	96	17,5
UNITRON	-	-	-	47	85	90	180	5,9
CMA	-	32	40	41	49	82	105	67,3
SPECTRUM	-	-	11	26	43	79	99	83,7
EBC	25	40	60	66	68	78	83	14,7
SOFTTEC	-	-	-	-	-	70	100	-
TELEMÁTICA	-	-	-	-	-	70	80	-
OIGITUS	-	-	-	62	34	57	90	67,6
METALMA	-	-	-	-	-	57	92	-
MAQUIS	-	-	-	-	-	54	75	-
SCRITTA	-	-	-	-	-	51	71	-
APPLETRÔNICA	-	-	-	-	19	48	60	152,6
MICROTEC	-	-	-	17	12	46	150	283,3
MUA	-	-	14	20	30	40	57	33,3
PERCOMP	-	-	-	-	-	40	144	-
GEPETO	-	22	28	24	30	36	71	20,0
PGM	-	-	-	-	-	35	120	-
ZANTHUS	-	-	-	-	26	35	70	34,6
LOGODATA	-	-	-	-	-	34	86	-
ELOGICA	-	-	-	-	-	29	35	-
STRATUS	-	-	-	15	21	27	43	28,6
PERIFÉRICOS	-	-	-	-	-	22	35	-
LOGUS	-	-	-	-	-	17	19	-
CETUS	-	-	-	-	-	16	34	-
DIGIBYTE	-	-	-	6	16	16	20	0,0
ELETROTELA	-	-	6	10	12	16	30	33,3
BASIC	-	-	-	-	-	15	36	-
VICTOR	-	-	-	-	-	14	21	-
AUTO-DATA	-	-	-	-	-	11	20	-
STI	-	-	-	-	-	11	23	-
DIGINET	-	-	-	-	-	8	15	-
TROPICAL	-	-	-	-	-	8	12	-
VIDEOTEK	-	-	-	-	3	5	9	100,0
MICRC SERVO	-	-	-	-	-	1	2	-
SISTEMA	-	50	100	189	247	-	-	-
P & D	-	-	-	144	207	-	-	-
GLOBUS	-	180	176	206	178	-	-	-
BRASCOM	-	-	46	60	146	-	-	-
TECNO DATA	-	-	-	92	85	-	-	-
SCHUMEC	-	-	4	20	28	-	-	-
CODIMEX	-	-	-	-	11	-	-	-
METALZILLO	-	-	-	-	10	-	-	-
TOTAL	4.028	6.926	3.159	13.399	15.734	21.340	28.359	38,9

Note: Table based on the companies that participated in the 1984 survey.

## Chapter VI - Software

This chapter discusses the data obtained from the respondent companies concerning software development expenditures, their sources for developing the programs used in the systems marketed in 1984 and, finally, the degree to which the industry is satisfied with each of those sources.

Of the 71 companies that took part in the survey, 40 report outlays for software development that totalled 30.3 billion cruzeiros in 1984. The projection for 1985 is about 90.2 billion cruzeiros; however, it is important to note that neither Sid nor Multidigit supplied estimates for 1985.

The following table enables us to see the relationship between software development expenses and total sales for the past 4 years.

<u>Year</u>	<u>Software Development Expenses as a Percent of Total Sales</u>
1981	4.4
1982	3.9
1983	3.1
1984	2.4
1985 (est.)	1.6

Remember, once again, that this percentage estimate for 1985 does not include figures from Sid, the company that has been the leader in software development expenditures during the past 3 years.

The following table lists the companies which have reported the heaviest expenses for software, in terms of percent of total software outlays.

<u>Company</u>	<u>1983</u>	<u>1984</u>
Sid	24.0%	27.4%
Digirede	11.1%	10.4%
Labo	3.4%	8.0%
Itautec	5.0%	5.0%
Prologica	3.9%	4.9%
Scopus	4.9%	4.8%
Racimec	4.4%	3.9%
Edisa	4.6%	3.7%
Sisco	5.9%	3.5%

We see that the nine companies mentioned in the previous table accounted for approximately 72 percent of the total volume of software expenses recorded in 1984.

Among the companies which supplied an estimated figure for software development outlays for 1985, we make particular mention of Digirede, with 26.6 percent of the total to be spent; Edisa, with 10.7 percent; Scopus, with 7.1 percent; Polymax, with 6.1 percent, Itaotec, with 4.7 percent, and Labo, with 4.4 percent.

As the data in the next table demonstrates, the bulk of the software expenses have been earmarked for each company's own software development team.

(Percentages)

Year Origin	1980	1981	1982	1983 *	1984 *	1985* (est.)
In-house Team	76,9	86,8	93,0	89,5	83,6	88,3
System Software Houses	10,1	10,6	6,4	5,8	6,5	6,6
Universities	0,7	0,7	0,5	3,7	7,7	3,6
Foreign Suppliers	12,3	1,9	0,1	0,9	2,1	1,4

\* Other sources of software development were considered in 1983, 1984 and 1985; these accounted for 0.1% of the allocated funds.

Special note should be taken of the increase observed in the relative participation by universities in software development. Significantly, this climbed to 7.7 percent in 1984, compared with 3.7 percent in 1983.

The following table lists the types of software, by development source.

Software Development Source		Type of Software			
		Operating Systems	Compilers	Product Programs	Application Programs
In-house Team	No. of Companies	34	22	30	30
	% of the Total	63,0	64,7	60,0	51,7
Technology Supplier	No. of Companies	6	4	5	1
	% of the Total	11,1	11,8	10,0	1,7
SOFTWARE/ SYSTEM-HOUSE	No. of Companies	7	6	13	23
	% of the Total	13,0	17,7	26,0	39,7
Universities	No. of Companies	5	1	1	3
	% of the Total	9,2	2,9	2,0	5,2
Others	No. of Companies	2	1	1	1
	% of the Total	3,7	2,9	2,0	1,7
TOTAL	No. of Companies	54	34	50	58
	% of the Total	100,0	100,0	100,0	100,0

It can be seen that in-house teams continued to be the major source of development for the four types of software in 1984.

It should be explained that some companies use more than one development source to obtain the same type of software.

The degree of satisfaction expressed by the companies that participated in the survey on this aspect, as related to their software development source, is presented in the following table.

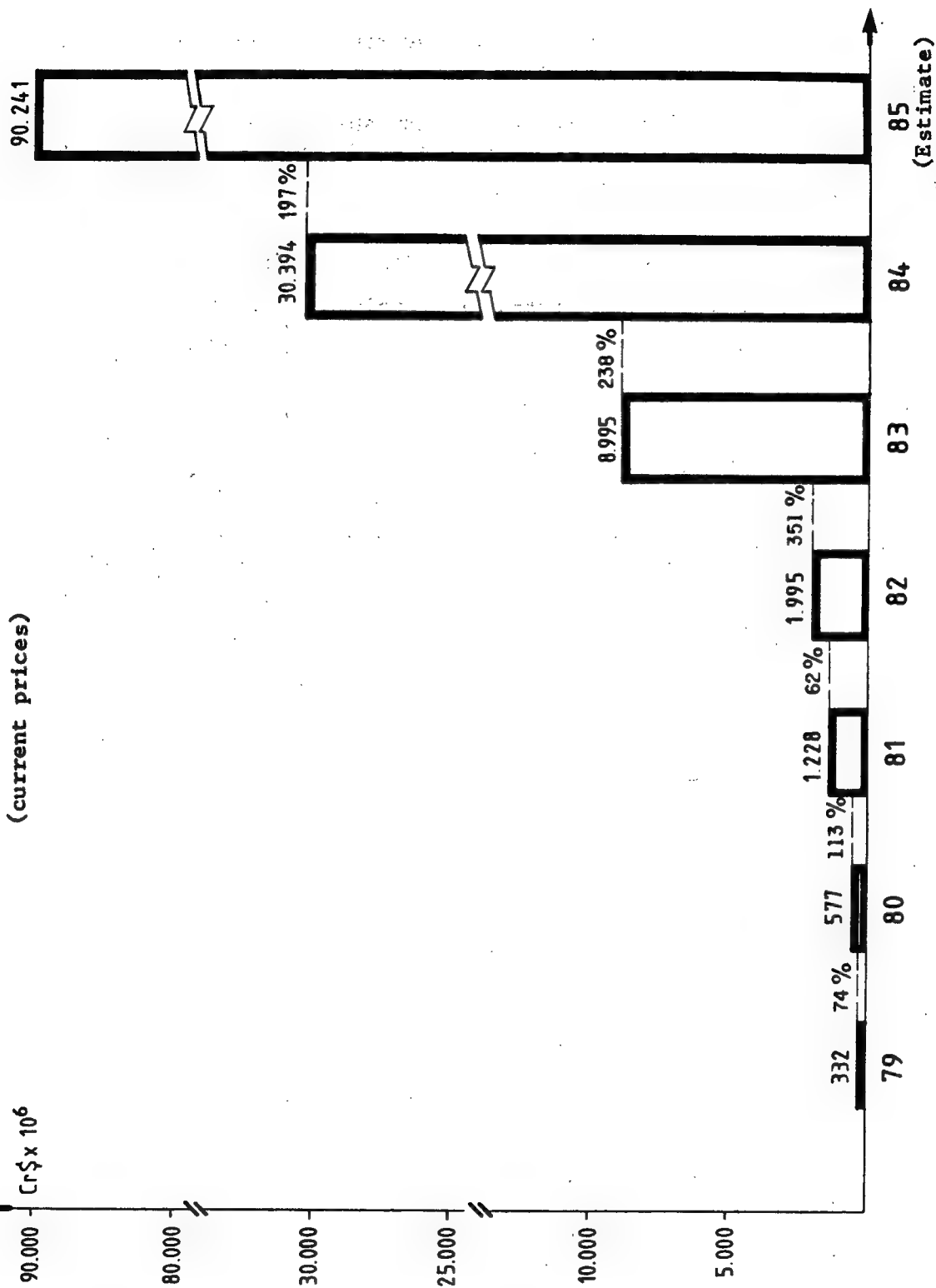
Source	Degree of Satisfaction		
	Poor	Fair	Good
In-house Team	—	—	100,0
Technology Supplier	18,8	25,0	56,2
Software Syst. House	8,0	44,0	48,0
Universities	—	25,0	75,0
Others *	—	50,0	50,0

\* Only two cases reported.

The trend in company expenses for software development is illustrated in the graph (Figure VI-1) on the next page.

Figure VI - 1

Trend in Software Expenditures by Companies  
(current prices)



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## Chapter VII - Hardware

This chapter is divided into two parts. First, an analysis of the systems market--Group 1 and Group 2; then a study of the market for peripherals and other devices.

### 7.1 - Systems

In an effort to maintain consistency with the historical series, the same division of the systems into two groups used in earlier reports was adopted; i.e., Group 1 contains the minicomputers, while the microcomputers constitute Group 2. Also, the few billing machines still marketed in 1984 have been included under "Miscellaneous Products."

The first table on the next page enables us to see the trend in each group's share of the market (in value terms) during recent years.

#### Group 1 Systems

It was found that Group 1 systems have gradually declined in relative importance among total systems marketed. This confirms the trend noted during the past 4 years. Group 1 systems represented 39.6 percent of the market in 1984.

In compensation, microcomputers have been increasing their share since 1979, reaching a substantial 60.4 percent in 1984.

In Chapter II of this report--because we have adopted the classic criterion of discussing separately the manufacturers of minis, micros, peripherals, and other devices--we will see that manufacturers of minicomputers still account for the largest portion of the market. This is because total sales by these companies include receipts from micros and peripherals produced in-house.

The second table on the next page shows the volume and value of the Group 1 systems sold each year, by manufacturer.

Cobra is still the largest Group 1 company in terms of both volume and value of sales. It accounted for 26.9 percent of the total volume of minicomputers sold in 1984. Nevertheless, its share has been declining gradually over the years, as can be seen in the table referred to above.

Even with the progressive reduction of the slice of the market represented by minicomputers in the face of the expansion of the microcomputers and,

(Value in Cruzeiro Millions)

Systems	1979		1980		1981		1982		1983*		1984	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Group 1	3,902,626	56.6	6,085,136	59.8	11,349,796	62.8	32,813,201	58.9	40,697,600	41.3	166,139,300	39.6
Group 2	1,453,500	24.8	2,839,000	27.9	6,299,868	34.8	22,007,003	39.5	57,963,028	58.7	253,164,074	60.4
Billing Machines	501,700	8.6	1,249,800	12.3	440,800	2.4	876,988	1.6	-	-	-	-
TOTAL	5,857,826	100.0	10,173,936	100.0	18,090,264	100.0	55,697,192	100.0	98,660,628	100.0	419,303,374	100.0

Volume and Value of Group 1 Systems Marketed Each Year, per Manufacturer

(cruzeiro millions)

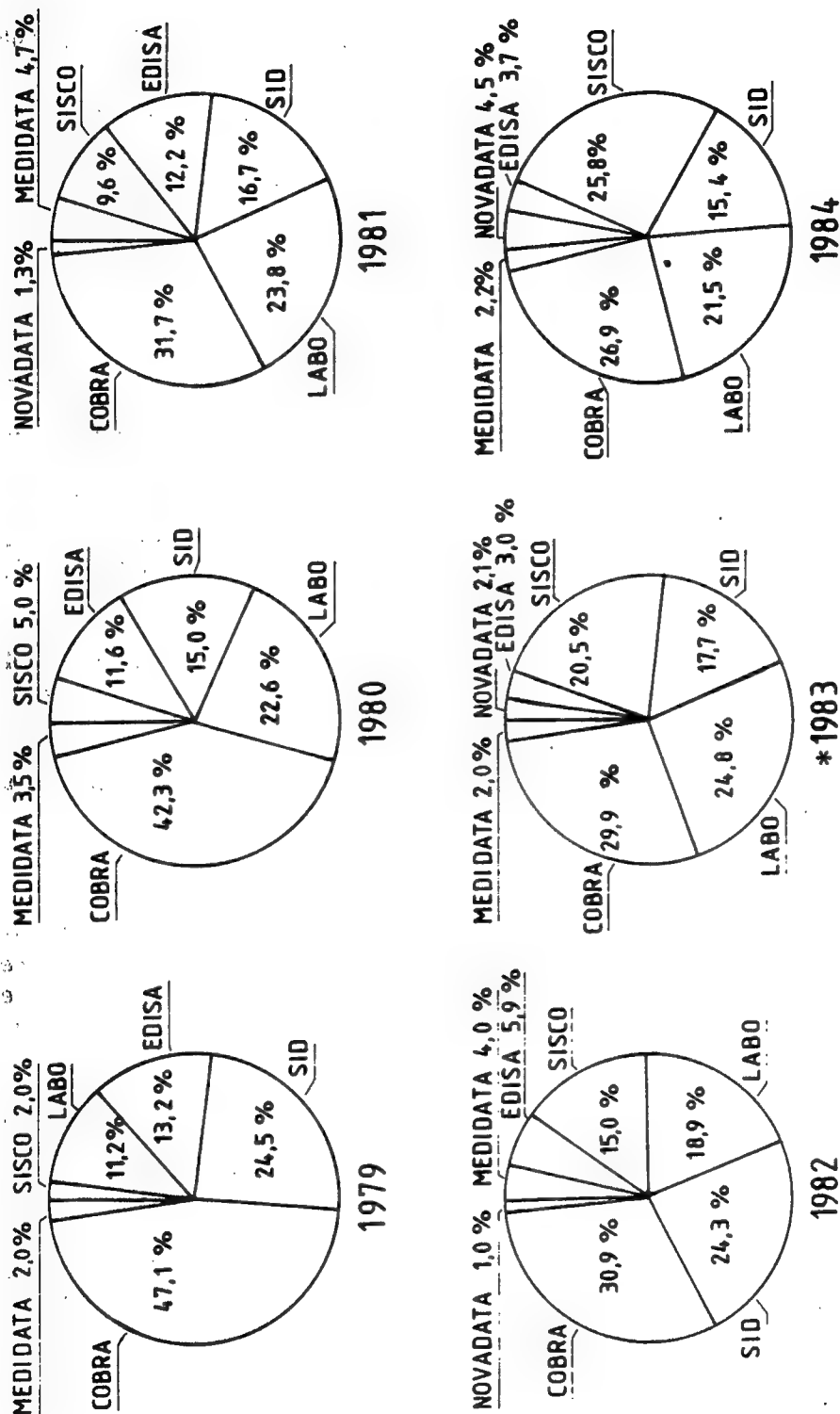
Company	1979		1980		1981		1982		1983*		1984	
	Volume	% of Total Volume	Volume	% of Total Volume	Volume	% of Total Volume	Volume	% of Total Volume	Volume	% of Total Volume	Volume	% of Total Volume
COBRA	383	47.1	1,888,008	42.3	2,832,202	31.7	3,440,000	30.9	10,731,800	28.9	223	28.9
LAJO	84	11.2	285,621	22.6	1,478,608	23.8	2,308,676	18.8	8,182,067	24.8	178	21.5
SIO	184	24.8	1,096,918	16.0	822,325	16.7	1,680,000	24.3	7,771,736	17.7	128	15.4
SISCO	15	2.0	86,986	6.0	502,276	7.6	1,703,318	15.0	4,178,088	20.5	214	25.8
EDISA	88	13.2	801,383	11.6	640,868	9.7	1,380,303	5.9	708,594	3.0	31	3.7
NOVADATA	-	-	-	-	10	1.3	35,800	1.8	207,202	2.1	37	4.5
MEDDATA	18	2.0	44,712	3.5	209,720	3.7	532,000	4.0	1,078,000	2.0	18	2.2
TOTAL	780	100.0	3,802,626	100.0	8,086,136	100.0	11,348,788	100.0	32,813,201	100.0	828	100.0
												166,139,300



Figure VII - 1

SEI / 84

Distribution of Annual Group 1 Systems Sales, by Manufacturer



No. Units Sold

Year	79	80	81	82	83*	84
Base	750	800	791	973	753	829

\* Corrected Figures

DEM / SEP / SEI

probably, the super minis, 1984 saw an increase of 10.1 percent in the number of minicomputer units sold, compared with 1983. The table below gives the percentage changes in sales per company from year to year since 1979. Note that only three minicomputer firms showed declines between 1983 and 1984.

Company	% Change	% Change	% Change	% Change	% Change
	79/80	80/81	81/82	82/83	83/84
COBRA	-4,2	-25,7	19,9	-25,2	-0,8
SISCO	166,7	90,0	92,1	5,4 *	38,9
LABO	115,5	3,9	-2,1	1,6	-4,8
SID	-34,8	10,0	78,8	-43,6	-3,7
NOVADATA	—	—	0	60,0 /	131,3
EDISA	- 6,1	4,3	-41,2	-59,6	34,7
MEDIDATA	86,7	32,1	5,4	-61,5	20,0
TOTAL	6,7	-1,1	23,0	-22,6*	10,1

\*Corrected Figure

Novadata continues to be the company that records the greatest growth in terms of units sold. It went from a rate of growth of 60 percent in 1983 over 1982, to 131 percent in 1984 over 1983.

Mention should also be made of the increase in the number of units marketed by Edisa and Medidata, 34 percent and 20 percent, respectively. These are companies that had experienced declines in unit sales in 1983.

Figure VII-1 illustrates the distribution, by manufacturer, of the volume of minicomputers marketed each year.

#### Group 2 Systems

Under the classification adopted in previous reports, Group 2 is composed of commercial and personal-use systems and data entry equipment. The role of these two segments in relation to total volume and value marketed between 1979 and 1984 can be seen in the first of the two tables reproduced on the next page.

The results for 1984 reconfirm the trend seen since 1980, when the relative importance of data entry equipment within Group 2 began to fall because it is being replaced by the microcomputers which, by using specific software, are capable of performing similar functions.

The data furnished in the second table on the next page ratifies this trend. In terms of number of units sold, data entry equipment exhibited an increase

(Percentages)

Group 2	1979		1980		1981		1982 *		1983 **		1984	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Comm. & personal-use Data Entry	1.1 98.9	1.5 98.5	30.2 69.8	47.9 52.1	58.1 43.9	70.8 29.4	98.0 2.0	92.1 7.9	98.8 1.2	96.8 3.2	99.2 0.8	97.7 2.3

\* Personal computers included beginning in 1982.

\*\*Corrected data.

Volume and Value of Group 2 Data Entry Systems Marketed Each Year, by Manufacturer (cruzeiro millions)																		
Company	1979			1980			1981			1982			1983			1984		
	Volume	% of Total	Value	Volume	% of Total	Value	Volume	% of Total	Value	Volume	% of Total	Value	Volume	% of Total	Value	Volume	% of Total	
DIGITUS	-	-	-	-	-	-	-	-	-	-	-	-	500	71.1	913 870	570	78.8	
POLYMAX	-	-	-	-	-	-	-	-	-	-	-	-	66	9.8	408 700	111	14.9	
ERC	8	0.5	4,296	28	2.0	17,790	56	4.8	32,000	48	10.8	150 000	19	2.7	100 000	31	4.2	
EDISA	-	-	-	185	13.0	134,680	387	30.9	349,312	199	42.8	507,440	51	7.3	338 000	18	2.5	
QUARTZIL	-	-	-	-	-	-	-	-	-	-	-	-	26	3.7	182 000	12	1.6	
COBRA	1 878	9.8	1 427,704	1 206	88.0	1 327,560	788	64.8	1 488,400	718	48.9	1 088,800	38	5.4	328,800	-	-	
TOTAL	1 836	100.0	1 432,000	1 421	100.0	1 480,000	1 187	100.0	1 880,712	482	100.0	1 746,240	703	100.0	1 871,370	742	100.0	
																	5 801 300	

of 5.5 percent in 1984. Although such equipment has been shrinking in importance over the years, the major service bureaus still require substantial numbers of these machines.

The table below shows the percentage changes in volume marketed from year to year, by manufacturer.

Group 2 Data Entry	% Change 79/80	% Change 80/81	% Change 81/82	% Change 82/83	% Change 83/84
DIGITUS	—	—	—	—	14,0
POLYMAX	—	—	—	—	60,8
EBC	250,0	96,4	- 10,9	- 61,2	63,1
EDISA	—	98,4	- 46,0	- 74,2	- 64,7
QUARTZIL	—	—	—	—	- 53,8
COBRA	-25,8	-36,7	- 71,9	- 82,3	-
TOTAL	-13,1	-16,5	- 61,0	52,2	5,5

The data entry equipment makers that had the best results in terms of units sold were EBC and Polymax, whose sales rose by 63.1 percent and 60.8 percent, respectively, in 1984.

Quartzil, Cobra, and Edisa suffered declines during the year under review; in fact, the latter been seeing its sales drop since 1982. As for Cobra, it no longer makes this type of equipment, having discontinued the line at the end of 1983.

Figure VII-2 illustrates the trend in distribution of data entry systems sold during the past 6 years, by company.

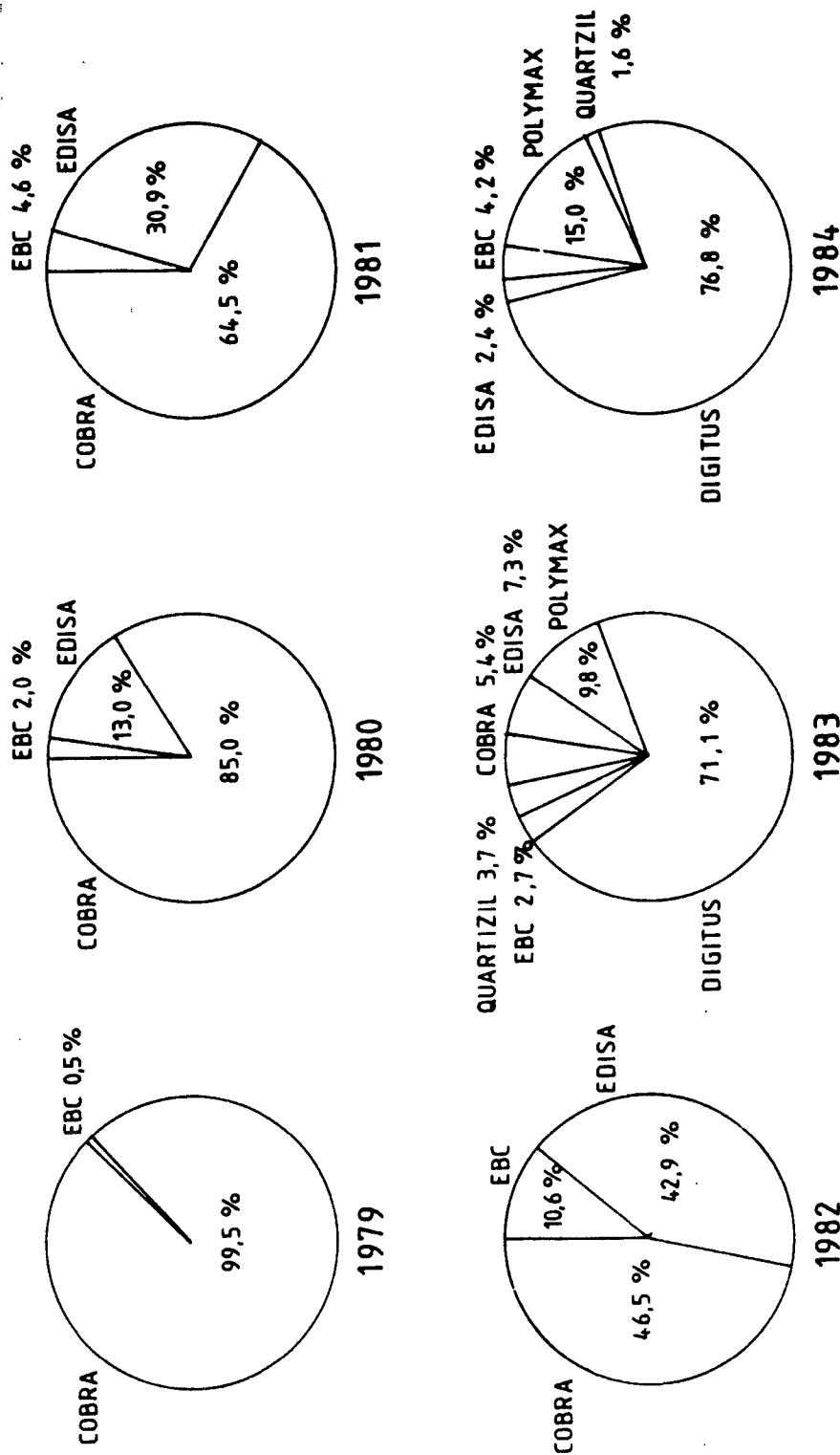
Once again, the impressive results obtained by the microcomputer segment were confirmed. Growth was on the order of 60.2 percent in terms of units sold during the year under review.

There were more companies manufacturing microcomputers in 1984--about 33 in all. These companies reported that they had sold 89,272 commercial and personal-use microcomputers of varying capacities. Only 1,757 of these were 16-bit micros. It is thought that the biggest increase in sales of that type of equipment occurred in 1985, but this can be quantified in the next survey. Data from the manufacturers lead us to expect a jump of about 30<sup>4</sup> percent in unit sales of this type of system for 1985.

Figure VII - 2

SEI/84

Distribution, by Manufacturer, of Annual Data Entry Systems Sales



Units Sold

Year	79	80	81	82	83	84
Base	1636	1421	1187	462	703	742

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The volume and value of the commercial and personal-use microcomputers marketed by the manufacturers during the period 1979-84 can be seen in the large table on the next page. Once again, the best results were obtained by Microdigital and Prologica, which accounted for 46.4 percent and 29.2 percent, respectively, of units sold in 1984. It should be pointed out, in this regard, that Itautec increased its share from 1.1 percent in 1983 to 6.3 percent of total microcomputers sold in the year under review.

Company Name	Change 80/81	Change 81/82	Change 82/83	Change 83/84
MICRODIGITAL	-	-	380,0	72,7
PROLOGICA	-	4.608,3	82,8	26,5
ITAUTEC	-	-	-	851,2
UNITRON	-	-	1.395,8	38,4
COBRA	36,9	83,5	19,9	57,8
SCOPUS	-	202,2	169,4	113,3
CCE	-	-	-	-
DISMAC	-	-	- 6,8	-9,9
POLYMAX	58,8	65,3	180,7	-29,3
SPECTRUM	-	-	247,2	140,0
SPLICE	-	-	323,1	1.463,6
SID	-	129,4	33,3	31,6
MICROTEC	-	-	700,0	400,8
DIGITUS	-	-	-29,4	-68,3
SOFTec	-	-	-	-
MAGNEX	-	-	-	-
EDISA	-	-14,2	28,9	84,6
VICTOR	-	-	-	-
RACIMEC	-	-	-	-
LABO	-	-	47,4	41,4
DIGIBYTE	-	-	54,9	96,2
APPLETRONICA	-	-	-	475,0
EBC	-	-	-	-
QUARTZIL	-	-	700,0	-55,9
SISCO	-45,5	-	-	-
MEDIDATA	-	-	-	-
LOGUS	-	-	-	-
AUTO-DATA	-	-	-	-
ELÓGICA	-	-	-	-
DIGINET	-	-	-	-
MAQUIS	-	-	-	-
BASIC	-	-	-	-
MICRO/SERVO	-	-	-	-
BRASCOM	-	-	466,7	-
SCHUMEC	-	-	172,7	-
CODIMEX	-	-	-	-
TOTAL	146,9	1.381,5	148,0 *	60,2

\* Corrected figure

As can be seen in the above table, Splice was the company that exhibited the greatest percentage change in quantities sold--1,463.6 percent.

Volume and Value of Group 2 Commercial and Personal-Use Systems Marketed Each Year, per Manufacturer

(cruzeiro millions)

Company	1979			1980			1981			1982 **			1983 ***			1984		
	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value
MICRODIGITAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHOLOGICA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ITALTEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UNITRON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COMRA	12	98.7	12,491	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCORUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DIMAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POLYMAX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPECTRUM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPALICE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MICROTEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DIGITUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SOFTTEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAGNET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EDISA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VICTOR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RACIMEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LARO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DIGIBYTE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
APPLETRONICA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QUARTZIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SISCO	6	33.3	9,009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MEDIDATA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LOGUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AUTO DATA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ELOGICA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DIGINET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAQUUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BASC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MICROSERVO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BRASCOM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCUMEC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COOMEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	18	100.0	21,909	614	100.0	1,358,000	1,818	100.0	4,448,156	22,459	100.0	20,290,783	58,711	100.0	58,081,868	88,772	100.0	267,362,770

\* Percentage less than 0.2%

\*\* Personal computers included beginning in 1982

\*\*\* Corrected Data

Figures VII-3 and VII-4 illustrate, respectively, the distribution of sales of commercial and personal-use microcomputers by manufacturer between 1979 and 1984, and the trend--in value terms--of Group 1 and Group 2 systems sales, as well as peripherals sales, during those same years.

From Figure VII-3 we find that there were more companies dividing up the microcomputer market in 1984 than there were in 1983.

As can be observed from Figure VII-4, 1984 sales of microcomputers exceeded sales of minicomputers, confirming the trend shown in the historical series. Peripherals had the highest rate of growth in terms of cruzeiro sales--about 397.3 percent, while sales of Group 2 systems rose by 340.9 percent in that same year. Peripherals will be discussed in the next part of this chapter.

#### Classification of Systems by Price Bracket, Expressed in ORTN's [Readjustable National Treasury Bonds]

Following the methodology used in the previous report, we shall now present an additional method of classifying the systems, i.e., arranging the average systems configurations sold by price bracket.

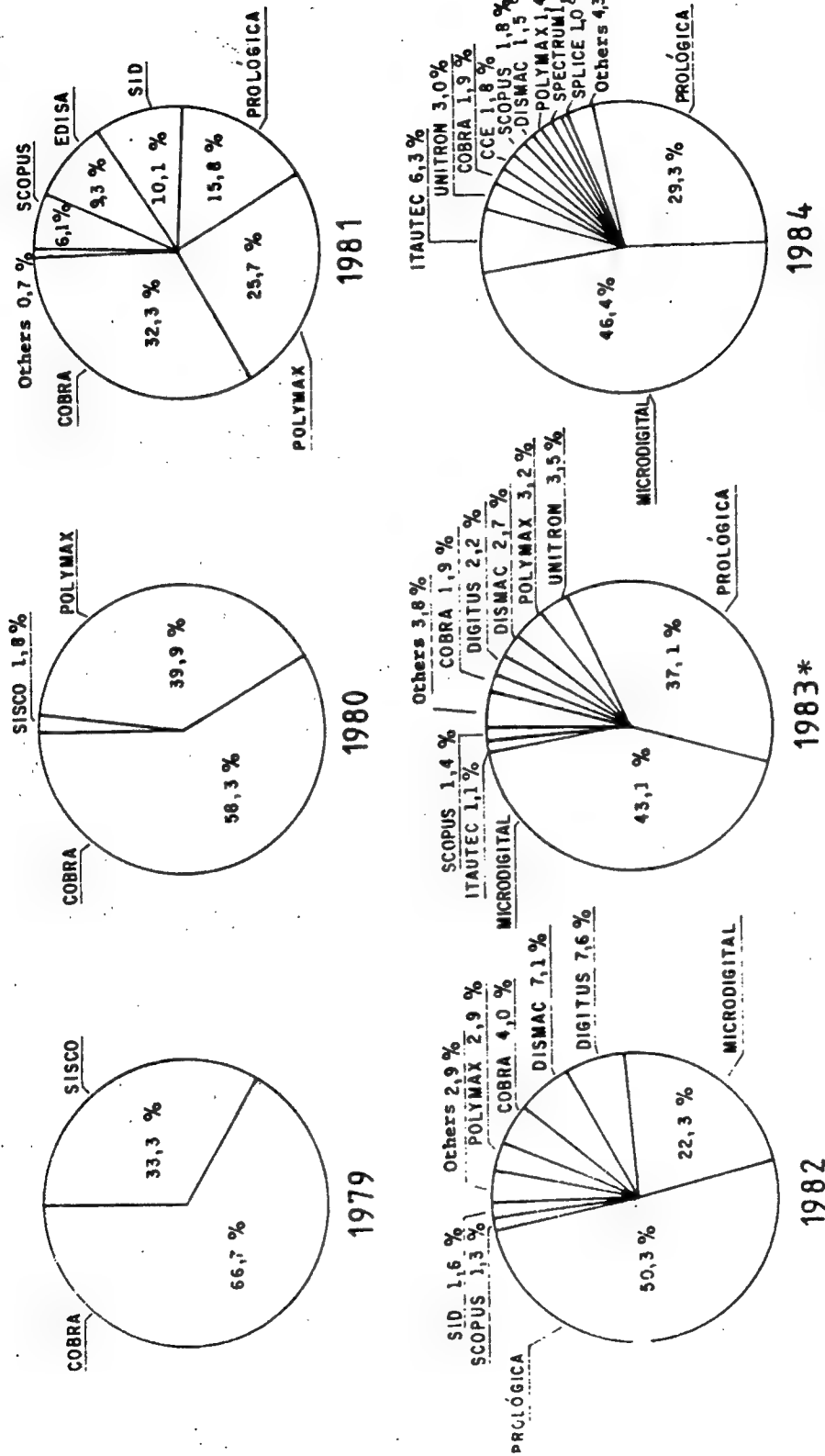
Because of the changes that have taken place in the market regarding systems prices, it has been necessary to modify the ORTN levels used previously, as we shall see in the following table.

Volume and Value of Group 1 and Group 2 Systems Sold, Arranged by Price Bracket			
CR\$ 1,000,000			
Price Expressed in # of ORTN's *	Value	Units Sold 1984	Units Sold 1985 (est)
To 100	37,719,730	65,464	184,265
Entre 100 e 500	36,266,650	8,790	22,136
Entre 500 e 1,000	15,668,955	1,712	5,837
Entre 1,000 e 1,500	100,550,825	10,951	18,073
Entre 1,500 e 3,500	40,043,980	2,106	6,492
Entre 3,500 e 8,000	25,889,880	404	867
Entre 8,000 e 20,000	149,764,050	652	570
Entre 20,000 e 30,000	7,598,000	22	18
TOTAL	413,502,070	90,101	238,258

\*[Readjustable National Treasury Bonds]



Distribution, by Manufacturer, of Group 2 Commercial and Personal-Use Systems Sales



Note: Personal computers included beginning in 1982.

\* Corrected Data

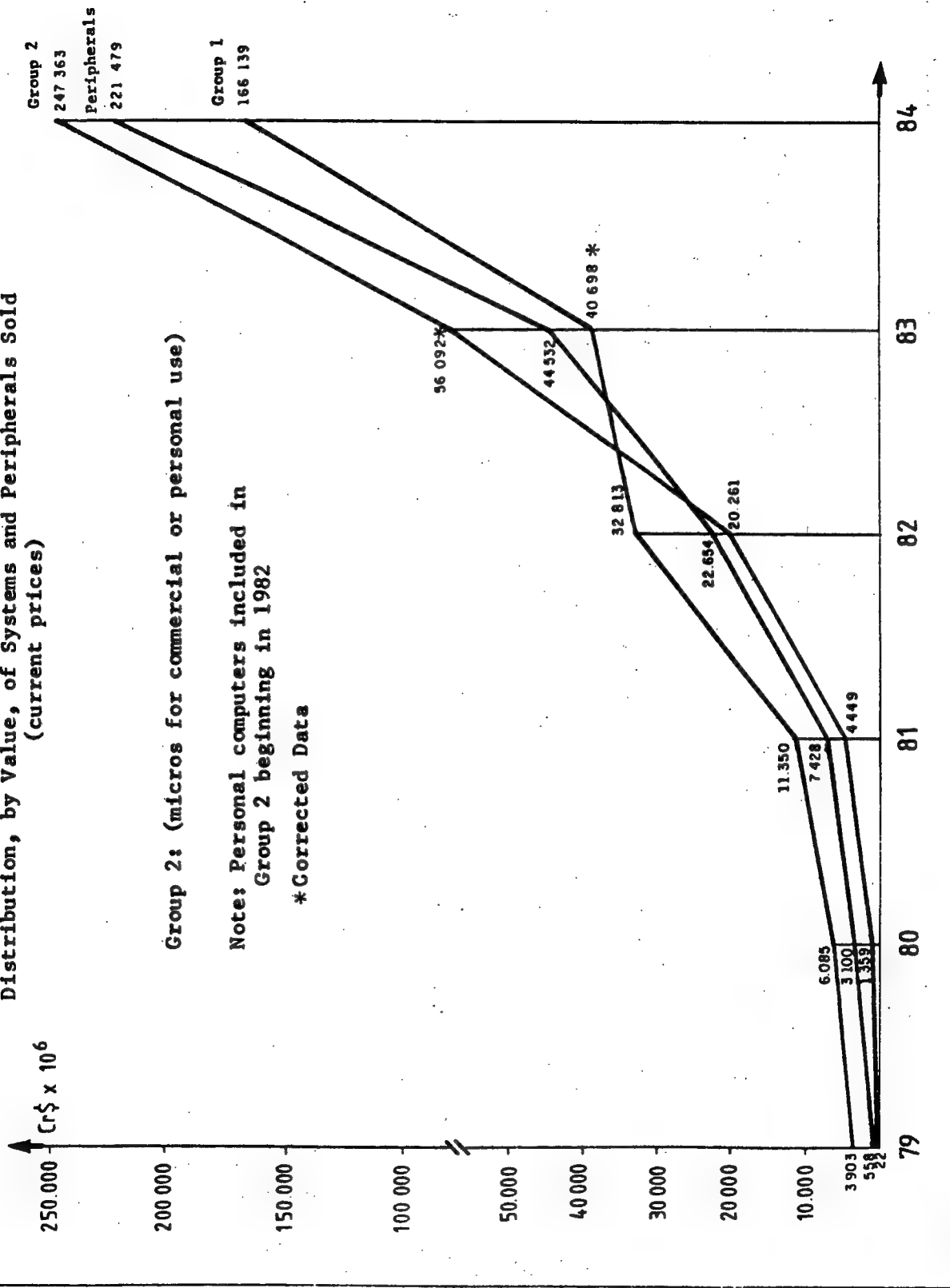
Units Sold

Year	79	80	81	82	83*	84
Base	18	614	1516	22459	55711	89272

Figure VII - 4

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Distribution, by Value, of Systems and Peripherals Sold  
(current prices)



DEM / SEP / SEI

Table VII	SEI/84
Distribution of Group 1 and Group 2 Systems by Manufacturer, Model, and Price Bracket	

[illegible]

When we analyze the above table, we find that 99.1 percent of the systems marketed are microcomputers and that they accounted for 59.8 percent of total receipts from systems sales. We should mention that with the exception of Sid, all the respondent companies gave estimates for 1985.

The distribution of the Group 1 and Group 2 systems by manufacturer, model, and price bracket (expressed in ORTN's) is presented in Table VII. The data reveal a substantial increase in the number of companies making microcomputers and in the variety of models available, compared with the findings of the 1983 report.

## 7.2 - Peripherals and Other Devices

In this part of the report, we shall first discuss the companies that are active in the peripherals market and then study the manufacturers of other devices.

In gathering data on the peripherals market, the survey concentrated on OEM (Original Equipment Manufacturing) sales, which are transactions made between manufacturers. We did not consider peripherals sold by companies that assemble systems around their CPU's. At the end of our discussion, we shall present a table on total sales of peripherals that are linked to systems.

The multi-column table on the next page shows the trend in the volume and value of peripherals sold through the OEM channel each year between 1979 and 1984. As we study that table, we see that the peripherals industry achieved sales of approximately 221 billion cruzeiros in 1984, which is 397.3 percent above the 1983 level. The leading product categories were serial printers and the older-style hard disks which, respectively, accounted for 23 percent and 22 percent of sales.

The next table shows the volume of peripherals marketed in 1984 and the estimates for 1985.

Peripherals			
Products	1984	1985 (Est.)	% Change 84/85
Hard Disks (old-style)	1.674	2.182	30,3
Winchester Disks	1.592	4.783	200,4
Floppy Disks	37.540	58.780	56,6
Magnetic Tape	438	606	38,4
Serial Printers	20.875	23.044	10,4
Line Printers	988	2.361	139,0
Video Terminals	10.492	13.562	29,3

Volume and Value of Peripherals Sold Each Year (cruzeiro millions)																		
Products	1978 % of			1980 % of			1981 % of			1982 % of			1983 % of			1984 % of		
	Volume	Total Volume	Value	Volume	Total Volume	Value	Volume	Total Volume	Value	Volume	Total Volume	Value	Volume	Total Volume	Value	Volume	Total Volume	
Older-style Hard Disks	220	8.4	65,000	684	6.1	545,800	1,120	8.3	1,842,100	1,771	8.1	5,184,008	1,478	4.5	10,782,100	1,674	2.3	48,727,300
Winchester Disks	-	-	-	-	-	-	-	-	-	165	0.5	148,296	786	2.4	1,000,580	1,592	2.2	7,967,000
Floppy Disks	318	8.3	16,300	2,339	20.8	178,500	4,244	31.4	448,700	18,488	44.6	3,837,000	18,190	49.0	7,204,200	37,549	51.6	44,710,401
Magnetic Tape	94	9.2	84,300	618	5.4	291,400	803	6.7	885,000	886	2.0	838,400	744	2.3	2,782,000	438	0.6	5,711,000
Serial Printers	86	2.8	21,300	1,588	14.0	408,100	2,148	15.8	1,182,300	8,512	24.8	8,562,100	8,279	25.0	8,562,300	20,875	28.4	50,968,010
Line Printers	32	0.9	12,800	1,113	10.0	734,900	970	7.3	1,281,300	1,228	3.6	2,464,800	1,293	3.9	2,992,000	988	1.3	22,587,660
Videoterminals	2,888	74.6	384,000	4,888	43.9	883,200	4,121	30.5	1,781,700	6,822	18.7	8,128,400	4,240	12.9	8,180,000	10,492	14.2	40,780,310
TOTAL	3,680	100.0	887,400	11,370	100.0	3,099,700	13,808	100.0	7,428,100	34,881	100.0	22,683,000	37,878	100.0	44,531,600	73,596	100.0	221,478,384

The estimates made previously for 1984 unit sales of older-style hard disks, serial printers, and video terminals proved to be lower than the quantities actually sold. In fact, the actual number of video terminals sold in 1984 exceeded the forecast by more than 100 percent.

The manufacturers who reported sales of older-style hard disks in 1983 are listed in the next table. Microlab accounted for 57.5 percent of total unit sales during the year under review.

Manufacturer	Hard Disks (older-style)					
	1980 %	1981 %	1982 %	1983 %	1984 %	1985 %
MICROLAB	38,9	51,1	42,0	58,0	57,5	36,8
ELEBRA INFORMÁTICA	13,3	29,6	45,0	42,0	42,5	63,2
MULTIDIGIT	47,8	19,3	13,0 *	—	—	—

\*Includes Winchester Disks

Winchester disks, [the newer-style hard disks] continue to increase in importance within the market, confirming the trend that began in 1982. Sales of this product category in 1984 amounted to about 7.9 billion cruzeiros. Manufacturers estimate that 4,783 units may be sold in 1985. The next table shows the share of total sales of Winchester disks held by each manufacturer.

Winchester Disks			
Manufacturer	1983 %	1984 %	1985 %
MULTIDIGIT	75,0	76,2	25,5
FLEXIDISK	13,0	20,8	65,8
PERCOMP	—	3,0	—
PROLÓGICA	12,0	—	—
ELEBRA INFORMÁTICA	—	—	8,7

Multidigit continued to hold the largest market share--76.2 percent in 1984. When asked to provide an estimate of 1985 sales, Multidigit gave a figure covering only the first 4 months, and Percomp did not give any forecast.

Floppy disk sales volume was about 44.7 billion in 1984. One of the four companies responsible for those sales, Perifericos, is a newcomer to the market. The table at the top of the next page shows the percentage share of floppy disk unit sales held by the various manufacturers.

Floppy Disks						
Manufacturer	1980 %	1981 %	1982 %	1983 %	1984 %	(Est.) 1985 %
FLEXIDISK	88,4	76,6	48,9	78,0	47,9	28,6
ELEBRA INFORMÁTICA	11,6	22,2	13,3	14,2	43,9	58,2
PROLÓGICA	—	1,2	37,8	7,8	5,9	8,4
PERIFÉRICOS	—	—	—	—	2,3	4,8

Elebra Informatica merits special mention because of the substantial increase in its share of floppy disk sales--from 14.2 percent in 1983 to 43.9 percent in the following year.

The estimates for 1985 call for 58,780 units to be sold, without counting the 23,750 units made by Cobra and Prologica and sold in conjunction with their respective systems.

Turning to the subject of magnetic tape, the following table shows the percentage shares of the manufacturers involved in this market.

Magnetic Tape						
Manufacturer	1980 %	1981 %	1982 %	1983 %	1984 %	(Est.) 1985 %
CONPART	9,7	51,1	88,5	100	100	97,7
ELEBRA INFORMÁTICA	—	—	—	—	—	2,3
GLOBUS	59,9	35,4	4,8	—	—	—
MICROLAB	30,4	13,5	6,7	—	—	—

It is well to recall, once again, that Microlab and Globus discontinued production of magnetic tape during the previous year; in fact, Globus itself went out of business in 1984.

The number of units sold by Conpart, which is still active in this segment of the market, has been decreasing in recent years.

The projection of 1985 magnetic tape unit sales furnished by Elebra Informatica is based on plans to serve the anticipated market for super minis, since the tape Elebra makes is high-capacity tape designed for such systems.

As has already been noted, the market for serial printers exceeded the results previously predicted for 1984; sales amounted to approximately 50.9 billion cruzeiros. Manufacturers of serial printers anticipate selling 20,044 units in 1985.

Following the procedure adopted in our earlier report, serial printers, regardless of performance type, were considered as a single category. Thus the percentage shares of unit sales held by the various manufacturers are as given in the following table.

Serial Printers						
Manufacturer	1980 %	1981 %	1982 %	1983 %	1984 %	1985 %
ELEBRA INFORMÁTICA	78,1	80,9	63,0	54,8	57,7	72,9
ELGIN	—	—	16,0	37,2	18,5	22,1
RACIMEC	—	—	—	—	9,1	—
PRÓLOGICA	—	—	—	—	7,2	—
SCRITTA	—	—	—	—	6,2	—
EXPANSÃO	—	—	—	—	1,3	5,0
GLOBUS	21,9	19,1	21,0	8,0	—	—

The above table does not include the serial printers made by Sistema, because that company will be discussed in the chapter on process control and industrial automation. We should, however, mention that Sistema sold 1,371 serial printers during the year under review.

Receipts from sales of 988 line printers amounted to approximately 22.5 billion cruzeiros in 1984. Globus, one of the two manufacturers that had been sharing this market until 1983 is no longer active. Part of its printer manufacturing capacity was taken over by Expansao in 1984.

Digilab served the bulk of this market, selling 79 percent of all line printers sold in 1984, as can be seen from the following table.

Line Printers						
Manufacturer	1980 %	1981 %	1982 %	1983 %	1984 %	(Est) 1985 %
DIGILAB	≈ 50,0	42,0	42,2	59,0	79,0	63,6
EXPANSÃO	—	—	—	—	21,0	36,4
GLOBUS	≈ 50,0	58,0	57,8	41,0	—	—



There was a substantial increase in unit sales of video terminals in 1984 compared with 1983. Estimates call for sales of 13,562 units in 1985. In terms of value, sales of video terminals totalled approximately 40.8 billion cruzeiros during the year under review. Furthermore, 1984 saw more manufacturers competing in this market than in 1983.

Even though its share fell to 40.5 percent in 1984, Scopus is still the leader in video terminal sales. TDA, a newcomer, also has a significant share--36.3 percent of total units sold. During the year under review, 16,125 video terminals were manufactured by assembly firms and sold as part of their systems.

The next table indicates the behavior of unit sales of this peripheral during recent years.

Video Terminals						
Manufacturer	1980 %	1981 %	1982 %	1983 %	1984 %	(Est) 1985 %
SCOPUS	87,0	78,4	79,6	87,0	40,5	43,0
TDA	—	—	—	—	36,3	43,0
COBRA	10,8	7,1	4,2	3,6	18,0	2,9
CMA	—	4,5	2,9	2,8	3,5	8,6
TELEMÁTICA	—	—	—	—	1,0	1,4
EBC	1,9	7,5	12,2	6,6	0,6	0,9
VIDEOTEK	—	—	—	—	0,1	0,2
PARKS	0,3	2,5	—	—	—	—
SCHUMEC	—	—	1,1	—	—	—

Note: Cobra furnished a partial estimate of its equipment.

The table reproduced on the next page indicates total peripherals marketed by the system assemblers in conjunction with their CPU's.

Special terminals are included in the "other devices" segment, but were included in the above table because some of them are also made by the systems assemblers.

Figure VII-5 portrays the trend in relative market share of the various types of peripheral equipment from year to year in terms of sales value.

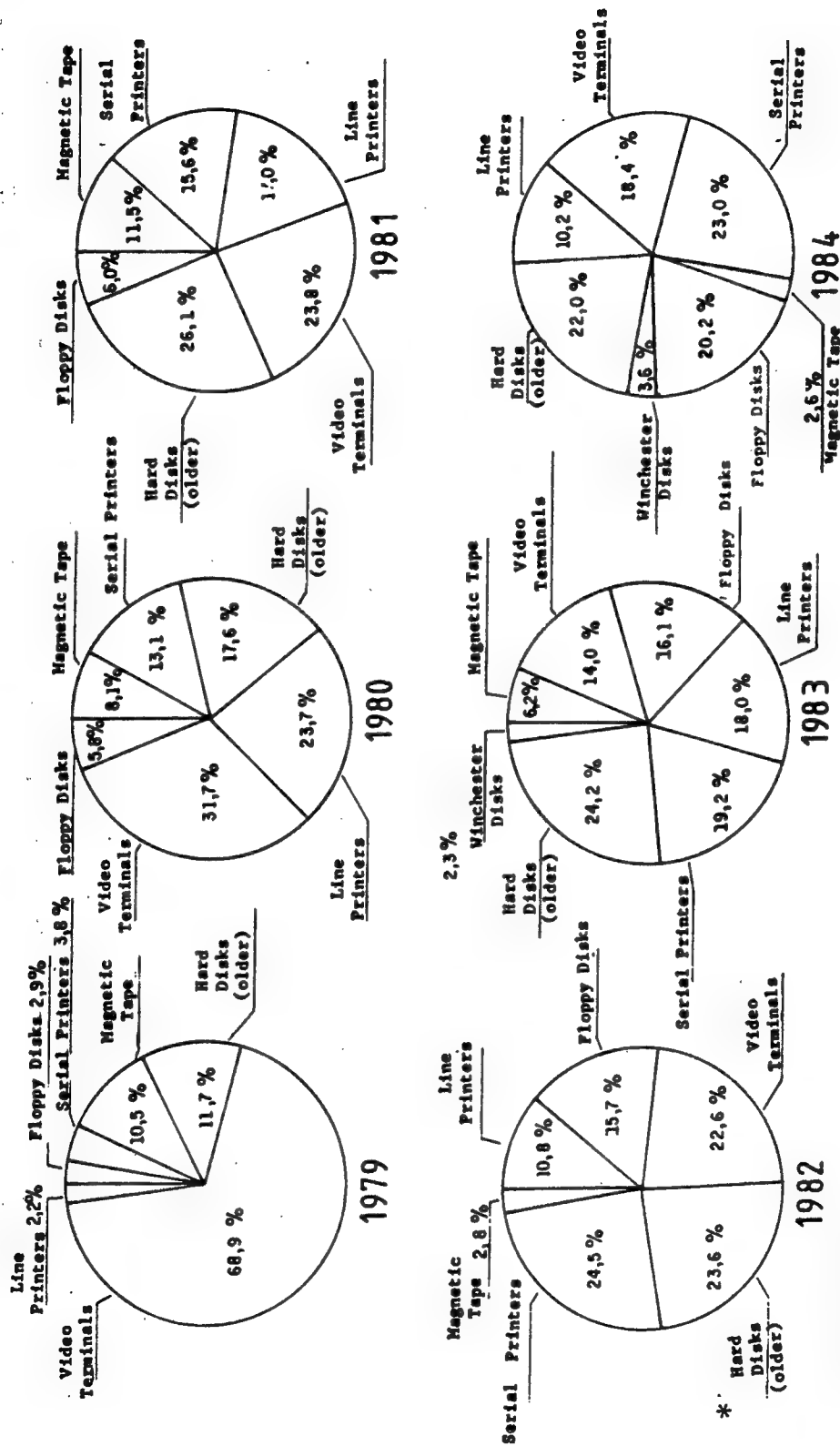
Volume of Peripherals Sold by System Assemblers With Their CPU's									
Product	1980	1981	1982	1983	1984	Change 80/81	Change 81/82	Change 82/83	Change 83/84
Hard Disks, old-style	975	990	1,169	1,542	2,525	1.5	18.1	31.9	63.8
Winchester Disks	-	-	-	655	1,249	-	-	-	90.7
Floppy Disks	2,155*	4,138	9,320	33,436	43,440	92.0	125.2	258.8	29.9
Magnetic Tape	461	411	217	494	389	-10.8	-47.2	127.6	-21.2
Line Printers	685	834	588	843	843	21.8	-29.5	43.4	0.0
Serial Printers	1,022	1,663	7,454	9,259	14,214	62.7	348.2	24.2	53.5
Video Terminals	5,200	4,817	9,540	11,346	16,125	-7.4	98.5	18.9	42.1
Special Terminals	-	-	-	9,509	24,816	-	-	-	160.9

\* Corrected figure

Figure VII - 5

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Trend in Peripherals Sales - Annual Share of Value per Item



\* Winchester disks included in this %

Units Sold

Year	79	80	81	82	83	84
Base	557,4	3,099,7	7,428,1	22,853,0	44,531,7	221,479,4

DEM / SEP / SEI

## Other Devices

This survey considers the other devices segment as being the market for modems, special terminals, concentrators, and the so-called "miscellaneous products." The latter include multiplexers, controllers, converters, adapters, interfaces, billing machines, circuit boards, text edit processors, and keyboard components.

The following table shows the total value of these products marketed in 1984.

<u>Other Devices</u>	<u>Value</u> (cruzeiro millions)	<u>1</u>
Modems	41,158.560	10.0
Special Terminals	181,535.510	46.7
Concentrators	72,499.239	18.7
Miscellaneous Products	<u>93,279.840</u>	<u>24.0</u>
<b>TOTAL</b>	<b>388,473.149</b>	<b>100.0</b>

Although sales of modems anticipated 1984 levels, 25,916 units were sold, and it is expected that 59,470 modems can be sold in 1985. Note that these figures include all types of modems.

The following table enables us to see the market share for each company during the 1980-84 period.

MODEMS	1980	1981	1982	1983	1984
ELEBRA TELECON *	48,8	48,4	23,7	50,4	50,2
COENCISA	48,7	36,0	55,1	40,6	31,9
MODDATA	—	8,3	10,7	2,0	6,3
DIGITEL	0,5	1,0	2,5	3,2	5,4
PARKS	1,7	4,0	5,0	3,6	4,8
CMA	—	1,5	0,8	0,2	0,9
ABC	—	—	—	—	0,3
TROPICAL	0,3	0,8	2,2	—	0,1
STI	—	—	—	—	**

\* Formerly Elebra Eletronica

\*\* Less than 0.1%.

Elebra Telecon and Coencisa have the biggest market shares; together they accounted for 82.1 percent of unit sales in 1984. We should mention that although Coencisa was absorbed by Moddata in 1984, the two companies were still using separate names at the time the data was collected.

The special terminals segment of the other devices market is important in that it accounts for a substantial part of total sales--181.5 billion cruzeiros in 1984. This is due to the accelerated pace of banking automation that has been taking place in Brazil during the past 2 years. The special terminals group includes miscellaneous financial terminals, consulting terminals, lottery terminals, point-of-sale terminals, and telepurchasing terminals.

Figures on the volume and value sold by each manufacturer in this segment are given in the following table.

(cruzeiro millions)

Special Terminals									
Manufacturers	1982			1983			1984		
	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value
DIGIREDE	1.925	17,4	2.200,0	3.416	17,6	5.864,6	10.100	33,4	42.300,0
SID	8.929	26,5	5.045,4	5.733	29,5	13.765,8	9.403	31,1	73.132,7
ITAUTEC	2.460	22,2	446,1	5.309	27,3	9.978,4	3.989	13,2	35.308,0
EDISA	—	—	—	404	2,1	381,0	2.892	9,6	3.535,0
RACIMEC	3.350	30,3	4.020,0	3.000	15,4	6.287,3	2.800	9,2	22.333,0
DIGILAB	397	3,6	152,0	998	5,1	642,0	846	2,8	2.534,0
COBRA	—	—	—	280	1,4	850,2	130	0,4	1.844,0
ZANTHUS	—	—	—	31	0,2	43,4	95	0,3	447,8
TECNODATA	—	—	—	265	1,4	558,0	—	—	—
TOTAL	11.081	100,0	11.863,5	19.436	100,0	38.171,7	30.255	100,0	18.153,5

Digirede significantly increased its participation in the market for special terminals by selling approximately 33.4 percent of the total units sold in 1984. Edisa also merits special mention, since it sold 72.4 million cruzeiros worth of these terminals. Once again, it is the banking automation process which is responsible for the expanded sales of this type of equipment.

The automatic teller machine, or ATM, is another product group for which the sales outlook is promising. Manufacturers of ATM's expect not only greater numbers of installations during the coming years but also a wider diversification in the functions performed by this type of "mini-bank." The companies responding to the survey report that 275 ATM's, having a total value of 23 billion cruzeiros, were sold in 1984.

The number of firms serving the market for concentrators rose this year, as can be seen from the table at the top of the next page. The 11 companies listed in the table successfully marketed 2,439 concentrators in 1984, for total sales of 72.4 billion cruzeiros. With 52.8 percent of unit sales, Digirede remains the leader in this market.

Concentrators						
Manufacturers	1983			1984		
	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value
DIGIREDE	427	45.9	5.038,1	1.287	52.8	30.756,0
ITAUTEC	147	15.8	208,3	616	25.3	2.852,0
SID	255	27,4	11.553,6	259	10,6	32.737,3
POLYMAX	54	5,8	241,2	95	3,9	2.957,7
PROLÓGICA	-	-	-	93	3,8	1.344,3
TELEMÁTICA	-	-	-	25	1,0	222,0
SCOPUS	-	-	-	24	1,0	411,0
EBC	44	4,7	150,0	18	0,7	201,6
PGM	-	-	-	13	0,5	820,0
TDA	-	-	-	5	0,2	107,6
ZANTHUS	4	0,4	19,5	4	0,2	90,1
TOTAL	931	100,0	17.210,7	2.439	100,0	72.499,6

Because of the growing importance that this equipment has been acquiring in connection with banking automation, we have adopted a new classification for concentrators beginning with this report. They are now grouped by function performed. Concentrators that link several video terminals along a single data line and transmit to a computer where the data is to be processed are called terminal concentrators. In comparison, agency concentrators not only concentrate the data but also process it.

The table at the top of the next page shows 1984 sales of concentrators in terms of both volume and value, by manufacturer.

It should be pointed out that the items grouped under "miscellaneous products" were responsible for 93.2 billion cruzeiros in sales. Digiponto accounted for 14.6 percent of this figure and continues to be the leader in keyboard components.

Table VIII lists the 71 companies that participated in this survey and provides figures on the size, in square meters, of that portion of their physical plant that is used exclusively for production.

Concentrators						
Manufacturers	1984					
	Terminal			Agency		
	Volume	% of Total Volume	Value	Volume	% of Total Volume	Value
DIGIREDE	665	42,7	824,0	622	70,6	29,932,0
ITAUTEC	616	39,5	2,852,0	—	—	—
SID	—	—	—	259	29,4	32,737,3
POLYMAX	95	6,1	2,957,7	—	—	—
PROLÓGICA	93	6,0	1,344,3	—	—	—
TELEMÁTICA	25	1,6	222,0	—	—	—
SCOPUS	24	1,5	411,0	—	—	—
EBC	18	1,2	201,6	—	—	—
PGM	13	0,8	820,0	—	—	—
TDA	5	0,3	107,6	—	—	—
ZANTHUS	4	0,3	90,1	—	—	—
TOTAL	1,558	100,0	9,830,5	881	100,0	62,669,3

Table VIII

Size of Production Area			
Company	AREA (m <sup>2</sup> )		
	1982	1983	1984
DIGIPONTO	-	-	12,500
PROLOGICA	4,000	5,992	10,781
DIGIREDE	2,000	7,000	8,500
DIGILAB	2,753	2,250	8,100
RACIMEC	2,400	6,000	8,000
COBRA	2,700	2,750	7,238
SCOPUS	3,545	7,000	7,000
ITAUTEC	5,625	5,625	4,856
SID	8,500	6,500	6,500
MENNO	-	6,000	6,000
SISCO	2,800	3,250	3,938
LABO	2,812	3,800	3,800
EDISA	3,600	3,600	3,600
POLYMAX	1,000	1,000	3,500
SPLICE	4,102	3,109	3,109
MICROLAB	2,480	3,106	3,106
DISMAC	-	3,000	3,000
ELGIN	2,500	1,000	3,000
ELEBRA INFORMÁTICA	1,400	2,150	2,800
MAGNEX	-	-	2,500
CONPART	800	2,000	2,100
QUARTZIL	2,100	2,100	2,100
MICRODIGITAL	800	800	2,000
COENCISA	3,000	1,548	1,872
DIGITEL	400	700	1,800
UNITRON	400	500	1,600
MECAF	-	-	1,500
NOVADATA	500	750	1,500
MICROTEC	250	300	1,400
MODDATA	1,200	380	1,260
FLEXIDISK	1,400	2,000	1,211
MDA	800	800	1,200
PARKS	1,200	1,200	1,200
CCE	-	-	1,000
DIGITUS	1,000	400	1,000
SCRITTA	-	-	1,000
SOFTTEC	-	-	1,000
ELEBRA TELECON	800	600	900
EXPANSÃO	-	-	890
SPECTRUM	400	600	800
TOA	-	1,980	750
PERCOMP	-	-	700
ABC-DADOS	-	-	600
CMA	750	600	600
PGM	-	-	600
ZANTHUS	-	-	600
ELETRODIGI	-	440	595
MULTIDIGIT	800	400	560
APPLETRÔNICA	-	10	525
CETUS	-	-	500
DIGIBYTE	-	500	500
GEPETO	285	300	500
TELEMÁTICA	-	-	500
METALMA	-	-	450
EBC	300	300	420
MAQUIIS	-	-	400
MEDIDATA	477	200	400
ELÓGICA	-	-	360
PERIFÉRICOS	-	-	352
ELETROTELA	300	300	300
LOGODATA	-	-	300
BASIC	-	-	220
DIGINET	-	-	200
AUTO-DATA	-	-	160
TROPICAL	-	-	160
VIDEOTEK	-	150	150
STRATUS	-	350	130
LOGUS	-	-	100
VICTOR	-	-	100
MICROSERVO	-	-	80
STI	-	-	35
P & O	2,413	2,413	-
SISTEMA	1,000	1,000	-
GLOBUS	1,000	685	-
TECNOLOGIA	-	485	-
SCHUMEC	100	400	-
BRASCOM	550	350	-
METALZILO	-	150	-
CODIMEX	-	60	-
TOTAL	72,342	98,693	154,008



## Chapter VIII - Principal Problems

This chapter discusses the main problems that the computers and peripherals industry have been facing over the years. So that the Brazilian companies would feel completely free to report the five problems that most affect their businesses, the respondents were not identified. We should mention that representatives of 19 major companies in the sector were interviewed in person, while the others responded by mail. Of the 71 firms that participated in the survey, 58--or about 82 percent--answered the questions on this topic.

After analyzing the group of problems reported, we can say that the five most often mentioned were as follows:

- (1) Unreliability on the part of suppliers of domestically-made components and parts (scarcity, delivery time, price, and quality);
- (2) Human Resources (difficulty of hiring and retaining skilled personnel, shortage of specialized manpower, and lack of a policy for training skilled technicians);
- (3) Company financial difficulties due to the high cost of funds;
- (4) Absence of a clear policy regarding competition from the computers and peripherals companies located in the Manaus Free Zone;
- (5) Cost of peripherals.

Following the procedure adopted in earlier surveys, the problems identified by the companies were grouped into four areas--production, economic and financial, political, and marketing. The following table shows where the industry's greatest problems lay in 1984, in the opinion of the survey respondents.

Percentages					
Area	1980	1981	1982	1983	1984
Production	12,8	32,1	33,3	33,7	32,5
Economic & Financial	29,4	17,4	29,0	27,1	22,5
Political	21,7	29,4	19,6	24,7	26,4
Marketing	36,1	21,1	18,1	14,5	18,6

Note that production problems, although less important (32.5%) in 1984 than in 1983, continue to dominate the list of difficulties mentioned.

There was an increase in concerns of a political and marketing nature in 1984.

The difficulties cited by the officers of the companies that participated in the survey have been grouped by area and enumerated in the following list. The figure in parentheses next to each item indicates the number of times the problem was mentioned.

### Production Problems

- Cost of peripherals (11)
- Difficulty of obtaining imported components (10)  
(scarcity, price, quality, and delivery time)
- Quality of domestic peripherals (2)
- Human resources (17)
- Unreliability of suppliers of domestic components (23)  
(shortages, delivery time, price, and quality)
- Lack of high-performance peripherals (2)
- Lack of regularity in the supply of peripherals and maintenance parts (4)
- Product standardization (2)
- Ability to import high-capacity Winchester disks hinders the introduction of the disks that are being and will be manufactured in Brazil (1)
- Difficulty of obtaining samples of components from overseas for technology updating purposes (1)
- Weak industrial structure in the Federal District (1)
- Physical plant too small (1)

### Economic and Financial Problems

- Financial problems caused by high cost of funds (16)
- Lack of credit lines for users (6)
- Advertising costs (1)
- Difficulty of obtaining import credit lines (3)
- General trend of the economy (2)
- Progressive devaluation of the domestic currency in terms of foreign currencies (1)
- Shortage of funds for research and development (7)
- Inadequate company capital blocks access to sources of credit (2)
- Sector liquidity (2)
- Working capital (4)
- Difficulty of obtaining financing from FINAME [Special Agency for Industrial Financing] (1)
- Difficulties in obtaining foreign financing (2)
- Resolution 767/1962 hinders imports (problems with foreign financing, high prices, high interest rates) (4)
- Unfamiliarity with the stock market (in order to go public) (1)

### Political Problems

- Excessively high taxes on import costs (3)
- Too much bureaucracy (SEI, CACEX, etc.) (5)

-No tax incentives	(6)
-Government financial support for small companies	(2)
-Uncertainties in national informatics policy	(2)
-Direct sales by Cobra to government-owned companies (the political market)	(1)
-Insufficient institutional support for university- corporate integration	(1)
-Difficulties in importing caused by bureaucratic restrictions	(9)
-No policy to protect software	(2)
-Absence of modern legislation on cash registers and point-of-sale terminals	(1)
-Bureaucracy in the export process	(2)
-Promotional support for exports	(1)
-Difficulty in buying foreign components	(1)
-Lack of support from financial entities for new projects	(1)
-Bureaucracy in the financing agencies (BNDES, FINEP, etc.)	(1)
-Excessive government bureaucracy in other Latin American countries	(1)
-Impediments to OEM sales of terminals to multinationals	(1)
-Tax policy	(2)
-The brain drain (internal migration)	(2)
-CIP [Price Council] actions taken without proper knowledge of the sector and causing potentially unacceptable losses	(1)
-Wage policy	(1)
-Absence of a special tariff system that would "reward" companies that attain the maximum degree of domestic content in their products	(1)
-Absence of a clear policy regarding competition from companies in the sector that are located in the Manaus Free Zone	(13)
-Approval of purchases of foreign technology, in detriment to development of domestic capabilities	(1)
-Difficulty of penetrating the telecommunications sector; preference given to "nationalized" companies	(1)
-Difficulties imposed by Embratel as regards use of the statistical multiplexers of the Transdata network	(1)

#### Marketing Problems

-Illegal competition (contraband)	(4)
-Unfair competition	(3)
-Lack of knowledge on the part of the purchaser as regards modernization and automation in general	(1)

- Seasonal nature of sales makes it impossible to obtain substantial discounts through a monthly schedule of OEM purchases (1)
- Great diversity and low volume of demand does not permit economies of scale (2)
- The "case by case" pricing policy adopted by some manufacturers (1)
- Market uncertainties (2)
- Attempts at "dumping" by powerful economic groups (1)
- Excessive number of trade fairs, diffusing customer attention (1)
- Lack of a more precise description of the process control market (1)
- Too many competitors (5)
- Personal computer market close to saturation (1)
- Customers do not pay promptly (1)
- Most sales to a single customer (1)
- No expansion of number of sales representatives (3)
- Engaged in a very specific segment, with a single product, thus having very high costs (1)
- Competing with similars bought by government-owned companies (1)
- Competition between domestic products and those using imported technology (2)
- Lack of professionalism in the government purchasing market (2)
- Action by multinationals that manufacture very small configurations which compete in the part of the market reserved for the mini computers (1)
- Sales fluctuate too much (1)
- Presence of banks in the informatics market (2)
- High maintenance costs incurred in connection with pioneer installations in Amazonia and some states in the Northeast (1)
- Competition from the assembly plants that use international sources and therefore escape development costs (1)
- Difficulties in achieving high domestic content because components and parts manufactured in Brazil are not the same as the imported ones (1)
- Shortage of components on the international market, caused by IBM purchasing policy (1)
- Companies installed in the Free Zone under-invoice and penetrate the southern states, selling at prices that are as much as 60 percent lower. (1)

## Part II - The Process Control and Automation Segment

This is the first study in which an attempt was made to gather data on the process control and industrial automation segment. The objective was to evaluate the development of this market and to set up a historical data series on it. The same questionnaire used for the general-use data processing segment was employed. It has not yet been possible to achieve the same degree of detail as we had been presenting for the computers and peripherals segment; therefore, this chapter will give general, aggregate data for this new segment. By heeding the suggestions made by companies active in this segment and studying the data obtained, we will be able to develop a more specific questionnaire for process control and industrial automation to be used in our next survey.

Of the 66 companies to which the questionnaire for the Overview survey was sent, only 28 participated in this part of the study. Keep in mind that we considered only those companies that have SEI-approved projects, marketed process control and industrial automation products in 1984, and responded sufficiently thoroughly to the questionnaire.

As has already been said in Chapter II, this report defines company "sales" as those sums obtained from marketing the products and through rental and other services provided by this segment of the informatics industry, net of taxes, during each calendar year--whether or not such sums were actually invoiced and entered into the account books. This being the case, the 28 companies in the sample reported net 1984 sales of approximately 68 billion cruzeiros in this product category segment. Company forecasts for 1985 call for total sales of approximately 340 billion cruzeiros.

During the year under review, the five sales leaders in terms of value were Metal Leve, Industrias Filizola, Sistema, Maxitec, and Digicon. Together, they accounted for 65.3 percent of total reported sales. A table at the top of the next page shows 1984 sales as reported by each company in the process control and industrial automation segment, with projections for 1985.

It should be noted that 30 percent of Comicro's sales receipts for 1984 (see table) were derived from CAD; the remaining 70 percent consisted of the sale and resale of microcomputers. The company expects its 1985 sales to be split about equally between CAD and microcomputer resale.

The next table shows that direct sales, at 75.8 percent in 1984, are the dominant marketing method used by the manufacturers in this segment.

<u>Marketing Method*</u>	<u>Percent of Sales</u>
Direct Sales	75.8
Indirect Sales	0.9
OEM	21.1
Leasing	2.1
Rental	--

\*No percentage data for Digicon

It should be stressed that OEM sales represented 21.1 percent of the total, or 13.5 billion cruzeiros. Of all the companies in the sample, only Digicon did not supply data as to the percentage share of sales corresponding to each marketing method. Once again, it must be kept in mind that companies engage in more than one form of marketing. The table directly below shows the number of companies that have adopted the various marketing methods under consideration, as well as the extent to which each company uses those selling methods.

Sales of Process Control and Industrial Automation Equipment - in Current Prices		
(cruzeiro millions)		
Companies	1984	(Est) 1985
ÁBACO	177,541	2,300,000
AIT	431,000	9,250,000
ALTUS	546,509	5,000,000
ATOS	870,000	7,800,000
CCE-ENGENHARIA	241,616	710,898
CTL	1,269,000	10,739,000
CHRONOS	807,000	11,230,000
COMICRO	3,055,000	6,000,000
CONTROLTEC	55,700	800,000
C.P.	1,845,290	2,954,500
DATAVAL	549,438	3,000,000
DIGICON	4,281,000	10,000,000
ECIL/P & D	3,500,000	15,000,000
ENGELETRO	2,846,752	10,000,000
ENGISTREL	300,000	2,300,000
FILIZOLA	1,517,000	7,224,000
GEOTRON	796,000	7,000,000
IMS	220,630	3,210,308
INDÚSTRIAS FILIZOLA	12,373,000	58,906,000
INDÚSTRIAS ROMI	2,878,000	26,440,000
MAXITEC	4,267,600	22,000,000
METALZILO	249,000	1,660,000
METAL LEVE	13,368,000	60,500,000
METRIXER	246,000	840,000
MICROCOM	145,000	600,000
PULSE	568,000	3,138,000
SISTEMA	10,364,000	41,832,000
ZSELICS	576,000	9,566,000
TOTAL	68,344,076	340,000,706

Importance of Various Marketing Methods, by Company					
Companies	1984				
	Sales			Leasing	OEM
	Direct	Indirect	Rental		
ÁBACO	54	31		15	
AIT	100				
ALTUS	70		30		
ATOS	13		87		
CCE-ENGENHARIA	50	50			
CENTELHA	20		80		
CHRONOS	100				
COMICRO	80			20	
CONTROLTEC		100			
C.P.	100				
DATAVAL	100				
ECIL/P & D	100				
ENGELETRO	45		55		
ENGISTREL	100				
FILIZOLA	100				
GEOTRON	81			19	
IMS	44	56			
INDÚSTRIAS FILIZOLA	100				
INDÚSTRIAS ROMI	80			20	
MAXITEC	100				
METACON	100				
METAL LEVE	65		35		
METRIXER		100			
MICROCOM	83		17		
PULSE	70		30		
SISTEMA	50		50		
ZSELICS	100				

We find that 25 companies, i.e., 90 percent of the manufacturers in the sample, report having used direct selling.

Adopting the same definition and classification of user economic activity utilized in Chapter III, we developed the following table:

<u>End-Users by Branch of Economic Activity*</u>	<u>1984</u>
Government	14.1%
Commerce	22.6%
Industry	59.7%
Public Financial Sector	0.2%
Private Financial Sector	1.6
Services	1.8

More than half of the sales of the process control and industrial automation segment are made to industry. Commerce and government are also important customers, accounting for 22.6 percent and 14.1 percent of purchases. Remember that only one firm--Digicon--did not supply a percentage breakdown of customers by branch of economic activity.

The information in the following table was calculated on the basis of percentages reported by all manufacturers in the sample concerning sales by state. Only Digicon failed to supply this data.

<u>State</u>	<u>Percentage of Total 1984 Sales</u>
Sao Paulo/Capital	39.2
Sao Paulo/Interior	14.6
Rio Grande do Sul	10.4
Bahia	9.3
Rio de Janeiro	8.3
Minas Gerais	4.5
Parana	4.2
Other States	4.2
Santa Catarina	1.8
Ceara	1.3
Federal District	1.0
Pernambuco	0.9
Para	0.3

\*No figures from Digicon

Sao Paulo State is the main consumer market for the products of this segment; it accounts for approximately 54 percent of total sales. It was found that a large part of the manufacturers--68 percent of the companies analyzed--are concentrated in Sao Paulo State. These companies accounted for 80.9 percent of total 1984 sales.

We learned that 76 percent of the product outlets used by the companies are located in the South and Southeast of Brazil. This confirms, once again, the great importance of marketing in those regions. Romi was the company that had the most outlets; it reported 14 branches.

Information from the 28 manufacturers indicates that the segment employed 2,480 people at the end of 1984. They estimated that employment might reach 3,203 in 1985.

The following table shows the distribution of the labor force by educational level in 1984, with a projection for 1985. Only one company, Engistrel, did not supply figures for this item.

<u>Distribution of Employees by Educational Level*</u>		
<u>Educational Level</u>	<u>1984</u>	<u>1985 (Est.)</u>
Primary	39.7%	36.3%
Secondary	42.9%	43.3%
University	17.4%	20.4%

\*No figure for Engistrel

In analyzing the above table, we can say that in 1984 this segment was characterized by employment of a substantial contingent of primary and secondary-school graduates. The estimates for 1985 indicate, however, that the number of workers with an elementary school education will decline, while the number of employees with a university or other higher education background will rise.

Overall expenditures for wages and benefits by the companies in this segment of the industry totalled 16.8 billion cruzeiros in 1984, equivalent to 24 percent of process control and industrial automation equipment sales.

As regards outlays for research and development, 24 companies in the sample reported having spent approximately 7.3 billion cruzeiros in 1984. Note that these were monies actually spent on new product development and/or the improvement of existing products.

Therefore, R&D expenses were equivalent to 10.7 percent of sales by these companies in 1984. This percentage is not expected to change in 1985.



To conclude this chapter, we would like to mention the main problems that the sector under consideration has been facing since its earliest years. Nineteen of the 28 companies that took part in the survey--68 percent of the respondents--answered the questions on this subject. The five difficulties most cited were:

- (1) Human resources (shortage of skilled manpower)
- (2) Shortage of components on the domestic market (price, quality, delivery time, and small lot size)
- (3) Difficulty in obtaining imported materials and components (price, delivery time, and small lot size)
- (4) Bureaucracy and red tape involved in dealing with government agencies
- (5) Working capital.

### Part III - Instrumentation

The results discussed in this part of the report were based on the information contained in the questionnaires sent to the companies that are active in the instrumentation segment of the informatics industry. Just as in the case of the process control and industrial automation sector discussed in Part II, figures on this segment are also appearing in the Overview for the first time. Therefore, the information will, once again, be presented in the form of aggregate data.

Only eight companies from our initial sample of 20 responded to the questionnaire. Only those companies that have manufacturing projects approved by the SEI and which sold at least one unit of product in 1984 were considered in the analysis.

Two of the companies studied--Funbec and Exata--make biomedical instruments. Acatec, Celm, Helmac, Marte, and Ven Den produce analytical instrumentation. Micronal dedicates its efforts mainly to the analytical area, although biomedical instrumentation accounts for a small portion of its sales. We should explain that the analytical instrumentation segment manufacturers instruments used for the physical and chemical analysis of materials in order to determine their nature, separation, composition, content, etc.

The following table shows 1984 sales by each company, as well as projections for 1985.

Sales of Instrumentation (Current Prices)		
Cruzeiro millions		
Companies	1984	(Est) 1985
ACATEC	2,262,620	7,919,180
CELM	2,029,000	7,955,000
EXATA	415,000	440,000
FUNBEC	7,134,000	28,685,000
HELMAC	264,175	960,000
MARTE	1,279,700	7,205,100
MICRONAL	8,717,000	68,401,000
VAN DEN	2,551,000	25,000,000
TOTAL	24,652,495	146,565,280

According to the table, total sales were reported to be 24.7 billion cruzeiros in 1984. The largest sales volume this year in value terms--8.7 billion cruzeiros--was posted by Micronal which, along with Funbec, accounted for 64.3 percent of total instrumentation sales in 1984.

Instrumentation sales are projected at 146.6 billion cruzeiros in 1985, which would mean nominal growth of 494.5 percent over the 1984 level.

As has already been stated, in this survey sales are considered to be the sums obtained from marketing the products and from rental and other services rendered by the informatics industry for each calendar year, net of all taxes and regardless of whether such sums were actually invoiced and entered on the account books.

The following table indicates, for 1984, the relative importance of the marketing methods most often used.

<u>Marketing Method</u>	<u>Percent of 1984 Sales</u>
Direct Sales	89.4
Indirect Sales	7.7
OEM	0.2
Leasing	2.7
Rental	--

We see that direct sale to the end user is by far the most common marketing approach, having been responsible for 89.4 percent of the volume of business done in 1984. All eight of the companies in the sample reported doing business in this manner.

As the next table shows, the companies use more than one marketing method.

Importance of Various Marketing Methods, by Company					
Companies	1984				
	Sales			Leasing	Rental
	Direct	Indirect	OEM		
ACATEC	100				
CELM	94	6			
EXATA	100				
FUNBEC	80	11		9	
HELMAC	32	68			
MARTE	56	42		2	
MICRONAL	97	3			
VAN DEN	98		2		

As regards distribution of sales among various customer categories, we can report that, according to information from the manufacturers, industry was the biggest customer in 1984, absorbing 44 percent of total sales. The relative importance of customers in other branches of the economy is the subject of the next table.

<u>End-Users by Branch of Economic Activity</u>	<u>1984</u>
Government	27.6%
Commerce	7.5%
Industry	44.4%
Public Financial Sector	--
Private Financial Sector	0.1%
Services	20.4%

The geographical distribution of sales can be seen in the following table.

<u>State</u>	<u>Percentage of Total 1984 Sales</u>
Sao Paulo/Capital	28.6
Sao Paulo/Interior	18.3
Rio de Janeiro	16.3
Minas Gerais	5.9
Rio Grande do Sul	4.3
Parana	3.6
Santa Catarina	1.9
Federal District	5.0
Pernambuco	3.2
Bahia	3.6
Ceara	1.4
Para	1.3
Other States	6.9

According to the data in the above table, sales in 1984 were concentrated along the Rio-Sao Paulo corridor, where 62.9 percent of the instrumentation was purchased. The market in Sao Paulo State accounted for 46.9 percent of total domestic sales and ranks in first place in terms of the consumer market for the instrumentation segment.

It is worth mentioning that five of the eight companies surveyed are located in Sao Paulo State.

Industries in the instrumentation segment employed 983 people at the end of 1984, more than half of whom had a high school education.

The next table shows the 1984 distribution of employees by educational level for 1984, along with an estimate for 1985.

<u>Distribution of Employees by Educational Level</u>		
<u>Educational Level</u>	<u>1984</u>	<u>1985 (Est.)</u>
Primary	26.2%	25.1%
Secondary	54.6%	55.0%
University	19.2%	19.9%

According to information supplied by seven manufacturers, about 1.4 billion cruzeiros were spent on research and development of new products and/or the improvement of existing products. This spending was equivalent to 5.7 percent of total 1984 sales by the segment. Acatec was the only company that did not give a figure for R&D spending in this year; but it did supply an estimate for 1985. Projections for 1985 R&D outlays by the eight companies total 7.5 billion cruzeiros, which is equivalent to 5.1 percent of anticipated sales.

Responses to the question on "principal problems of the manufacturing companies" were received from three companies, or 37.5 percent of our sample. The difficulties most often cited were:

- (1) Human resources (shortage of specialized manpower and high rate of turnover among R&D personnel)
- (2) Shortage of electronics raw materials on the domestic market (high cost, quality)
- (3) Company financial difficulties due to the high cost of funds.

# COMPANIES PARTICIPATING IN THE SURVEY IN 1984

- |                             |                             |               |
|-----------------------------|-----------------------------|---------------|
| • ÁBACO                     | • ENGISTREL                 | • MICRO/SERVO |
| • ABC-DADOS                 | • ELEBRA INFORMÁTICA        | • MICROLAB    |
| • ACATEC                    | • ELEBRA TELECON            | • MICRONAL    |
| • AIT                       | • ELETRODIGI                | • MICROTEC    |
| • ALTUS                     | • ELETROTELA                | • MODDATA     |
| • APPLETRÔNICA              | • ELGIN                     | • MULTIDIGIT  |
| • ATOS                      | • ELÓGICA                   | • NOVADATA    |
| • AUTO-DATA                 | • EXATAINSTRUMENTAÇÃO ELET. | • PARKS       |
| • BASIC                     | • EXPANSÃO                  | • PERCOMP     |
| • CCE DA AMAZÔNIA           | • FILIZOLA                  | • PERIFÉRICOS |
| • CCE-ENGENHARIA            | • FLEXIDISK                 | • PGM         |
| • CELM                      | • FUNBEC                    | • POLYMAX     |
| • CTL                       | • GEOTRON                   | • PROLÓGICA   |
| • CETUS                     | • GEPETO                    | • PULSE       |
| • CHRONOS                   | • HELMAC                    | • QUARTZIL    |
| • CMA                       | • IMS                       | • RACIMEC     |
| • COBRA                     | • INDÚSTRIAS FILIZOLA       | • SCOPUS      |
| • COENCISA                  | • INDÚSTRIAS ROMI           | • SCRITTA     |
| • COMICRO                   | • ITAUTEC                   | • SID         |
| • CONTROLTEC                | • LABO                      | • SISCO       |
| • CONPART                   | • LOGODATA                  | • SISTEMA     |
| • C.P. INDÚSTRIA E COMÉRCIO | • LOGUS                     | • SOFTEC      |
| • DATACAL                   | • MAGNEX                    | • SPECTRUM    |
| • DIGIBYTE                  | • MARTE                     | • SPLICE      |
| • DIGICON                   | • MAQUIS                    | • STI         |
| • DIGILAB                   | • MAXITEC                   | • STRATUS     |
| • DIGINET                   | • MDA                       | • TDA         |
| • DIGIPONTO                 | • MECAF                     | • TELEMÁTICA  |
| • DIGIREDE                  | • MEDIDATA                  | • TROPICAL    |
| • DIGITEL                   | • MENNO                     | • UNITRON     |
| • DIGITUS                   | • METALZILO                 | • VAN DEN     |
| • DISMAC                    | • METAL LEVE                | • VICTOR      |
| • EBC                       | • METALMA                   | • VIDEOTEK    |
| • ECIL P & D                | • METRIXER                  | • ZANTHUS     |
| • EDISA                     | • MICROCOM                  | • ZSELICS     |
| • ENGELETRO                 | • MICRODIGITAL              |               |

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Note: No Table IV or VI in the original report.